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The International Collaboration of Orthopaedic Nursing (ICON): Best Practice Nursing Care Standards for Older Adults with Fragility Hip Fracture

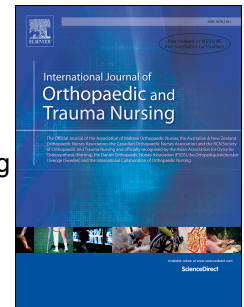
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The International Collaboration of Orthopaedic Nursing (ICON): Best Practice Nursing Care Standards for Older Adults with Fragility Hip Fracture

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INTRODUCTION

The purpose of this document is to provide nurses who care for older adults with fragility hip fracture with a framework to promote safe and optimal care for this vulnerable population. The successful application of the standards of care contained in this document requires clinical expertise and evidence-supported decision-making in order to maximize patient outcomes. In 2012 and 2013 a two part consensus document published in the *International Journal of Orthopaedic and Trauma Nursing* entitled “Acute nursing care of the older adult with fragility hip fracture: an international perspective” was developed by nursing leaders from seven countries across 3 continents who delineated the recommended care standards for this vulnerable population (Maher, et al, 2012; Maher, et al, 2013).

Several years after publication of the original work, an audit tool was developed to explore the extent to which those recommended care standards were reflected in nursing policies and protocols in acute care settings (MacDonald, et al, 2018).

Distribution to 35 acute care sites around the world revealed a continued gap between what is known to be best practice and the care standards reflected in nursing policies and protocols. Those sites that participated in the audit indicated the audit process served as a gap analysis, raising awareness of opportunities for improvement.

Over five years have passed since the initial document was published. The present paper reflects a review of the literature and updating of the previously published standards to keep abreast of the latest knowledge, evidence and science. The section on mobility has been expanded and introductory material about frailty and sarcopenia have been

added. Contributors are internationally recognized clinicians, educators and academicians experienced in care of the older adult with fragility hip fracture. They represent eleven countries across four continents. The focus remains on nurse-sensitive quality indicators specific to older adults with hip fracture, including:

- Pain
- Delirium
- Pressure Ulcers/Injuries
- Fluid Balance/Nutrition
- Elimination: Constipation/Catheter Associated Urinary Tract Infection
- Prevention of secondary fracture

This update coincides with the release of a global Call to Action issued by the Fragility Fracture Network (Dreinhöfer, et al., 2018). This call to action serves to raise awareness of the global health crisis that will result from the rising number of fragility fractures. By 2010, the global incidence of one of the most common and debilitating fragility fractures, hip fracture, was estimated to be 2.7 million cases per year (Gulberg, et al., 1997). Conservative projections suggest that this will increase to 4.5 million cases per year by 2050. While all countries will be impacted, in absolute terms, Asia will bear the brunt of this growing burden of disease, with approximately 50% of hip fractures occurring in this region by the middle of the century (Cooper, et al., 1992). The associated costs are staggering: in Europe in 2010, costs related to osteoporosis were €37 billion, while in the United States estimates for fracture costs for 2020 are estimated to be \$22 billion (Hofheinz, 2018).

In order for global health care systems to survive this impending challenge, evidence-based care strategies must be adopted. For those who sustain a fracture, care for this vulnerable population must be prioritized and based on best practices. Clinicians must possess a heightened awareness that the first fragility fracture is a signal to address underlying bone health and prevent the cycle of recurring fractures. This paper provides clinicians who care for older adults with fragility hip fracture with a resource that contains current best practice evidence-based care standards.

FRAILITY & SARCOPENIA

Frailty and sarcopenia are complex geriatric syndromes, often overlapping in older individuals, that are recognized as important contributors to falls and fragility fracture (see Box 1).

Insert Box 1 near here

Frailty is decline across multiple organ systems, placing the frail elderly at risk for functional deficits and comorbid disorders (Gielen, et al., 2012). In a recent study of community dwelling adults aged 65 and older, frail older people were more likely to experience recurrent falls when compared to both robust older adults and pre-frail older adults (Cheng & Chang, 2017).

Sarcopenia is an age-related decline in muscle mass and subsequent function that is highly prevalent in orthopaedic populations and associated with higher hospital costs, rates of falling, and subsequent fracture (Marty, et al., 2017). It is a key

component of the frailty syndrome that, on its own, puts older adults at risk of fragility fracture (Milte & Crotty, 2014).

Sarcopenia is one cause of frailty, but not all frail persons are sarcopenic and not all individuals with sarcopenia are frail (Mijnarends, et al., 2015). Identifying patients with these syndromes is important in the management of older adults who have sustained a fragility fracture as they impact the patient's ability to recover (Marques & Queirós, 2018).

Frailty

Frailty is characterized by increased vulnerability and diminished resistance to stressors that increase the chance of functional deterioration and adverse health outcomes (Morley, et al, 2013); Rodriguez-Mañas, et al., 2013). Frailty can be physical or psychological or a combination of the two elements when physical frailty is coupled with cognitive impairment.

Early diagnosis can improve an individual's care and have an important role in preventing fractures in community dwelling adults (Cheng & Chang, 2017). Because frailty is a manageable condition, the Consensus Group led by Morley (Morley, et al., 2013) recommends screening all individuals aged 70 and older.

There are two common approaches or models used to embody the frailty definition. The first approach, described by Fried and colleagues (Fried, et al., 2001), operationalized frailty as a syndrome meeting three or more of five phenotypic criteria. These criteria consist of: muscle weakness (measured by grip strength); slowness (measured by walking time); low level of physical activity (measured by Kcal/week

burned); exhaustion or poor endurance (measured by self report); and weight loss (more than 10lbs lost unintentionally in the previous year) (Chen, et al., 2014).

Individuals meeting only one or two of these criteria are considered to be pre-frail.

The second approach views frailty as the sum of an individual's assets that help them to live independently relative to the number of deficits and non-specific disorders that challenge an individual's ability to respond to health stressors (Rockwood & Mitnitski, 2007). Deficits include; diseases, physical and cognitive impairment, psychosocial risk factors and common geriatric syndromes (Jones, et al., 2004; Searle, et al., 2008).

There are a range of tools available to assess frailty, including the rapid 5 question FRAIL Scale developed by Morley and associates (Morley, et al., 2012) and the FRAIL Index (Rockwood & Mitnitski, 2011) which is based on a comprehensive geriatric assessment and in which 30-70 deficits are typically counted. A recent survey noted that many of the 388 responding clinicians from 44 countries used more than one instrument (Bruyère, et al. 2017) to assess frailty. An umbrella review by Apóstolo and colleagues (Apóstolo, et al., 2017) concluded that there is no one universally appropriate specific screening tool to identify frailty that could be advised for health professionals. The authors also note that there is a "clear need for research on ways to assess frailty and potential resilience in acutely ill people" (p. 1195).

Frailty is a dynamic condition that can improve or worsen over time and might be reversible or responsive to interventions. Currently there is emerging evidence about four possible treatments for frailty including; exercise (aerobic and resistance), caloric

and protein supplementation, vitamin D supplementation, and reduction of polypharmacy (Morley, et al., 2013; Morley, 2014; Tello-Rodriguez & Varela-Pinedo, 2016).

Sarcopenia

Sarcopenia is age-related loss of muscle mass and strength with resulting decrease in function that affects balance, gait, and overall ability to perform tasks of daily living. Decline in skeletal muscle mass begins around age 30 with a significant acceleration after age 65, accompanied by a concomitant reduction in muscle strength (Curcio, et al., 2016). Muscle strength is a critical component of walking and its decrease in the older adult contributes to a high prevalence of falls (Dhillon & Hasni, 2017). Early recognition and intervention can modify some of these detrimental outcomes.

Some major risk factors for sarcopenia include; lack of exercise, age-related decreases in hormone concentrations and a decrease in the body's ability to synthesize protein, combined with inadequate caloric and/or protein intake (Dhillon & Hasni, 2017). Acute and chronic illnesses raise the risk level.

Screening for sarcopenia may not be routine in many clinical practices. However, screening for impairment in physical function and activities of daily living (ADL's) should be routine for all older adults. Individuals with impaired ADLs and those who describe a noticeable decline in function, strength, or overall health status should have more specific testing for sarcopenia (Brown & McCarthy, 2015). The European Working Group on Sarcopenia in Older people (EWGSOP), in their consensus document, outlined an algorithm to aid the screening and diagnosis of sarcopenia (Cruz-Jentoft, et al., 2010).

Gait speed was proposed as the first step in the screening process. Those with gait speeds of 0.8m/s or less would then undergo a second performance assessment such as grip strength. Those meeting the criteria for low grip strength would finally be assessed by dual-energy X-ray absorptiometry (DXA) or bioelectrical impedance analysis (BIA).

More recently, Ligouri and colleagues (2018) recommend the following tests for use in clinical practice: handgrip strength, gait speed and/or the Short Physical Performance Battery (SPPB) and 'timed up and go' from a chair. Individuals with low muscle function should be referred for muscle mass analysis. MRI and CT scan are the most accurate imaging methods for muscle mass, but DXA and BIA continue to be used.

Exercise and nutrition are key interventions to prevent, treat, and slow the progress of sarcopenia. Both resistance and aerobic exercise increase muscle strength (Ali & Garcia, 2014) while resistance exercise produces the most significant benefits (Lozano-Montoya, et al. 2017). Evidence shows that older adults will require higher daily amounts of dietary protein to counteract age-related changes in protein metabolism and the higher catabolic state associated with chronic or acute diseases (Bauer, et al., 2013; Deutz, et al., 2014). Ten Haaf and associates (2018) found, in their cross-sectional study, that the interaction between higher physical activity and higher total protein intake was significantly associated with better quality of life.

Pharmaceutical agents are under investigation with no clear evidence of benefit yet. Growth hormone increases muscle protein synthesis but does not lead to increases in muscle strength and function while producing a variety of adverse side effects (Dhillon & Hasni, 2017). Testosterone and other anabolic steroids have a small positive

effect on muscle strength and mass but have significantly negative side effects such as increased risk for cardiovascular events for both sexes and increased risk of prostate cancer in men (Sakuma & Yamaguchi, 2012). A range of therapies currently being investigated include selective androgen receptor modulators (SARMs) which have potential because of their tissue selectivity for muscle and bone tissue that do not affect other organs thereby limiting adverse side effects (Ligouri, et al, 2018). Other pharmacologic therapies being studied include myostatin, vitamin D, angiotensin converting enzyme inhibitors and ghrelin, among others.

Frailty and Sarcopenia: Summary of Best Practice

- Frailty and Sarcopenia often, but not always, occur together
- Frailty is manageable and all adults over 70 should be screened
- Treatment guidance for frailty includes exercise, nutritional and vitamin supplementation, and reduction in polypharmacy
- Sarcopenia is age-related loss of muscle mass and strength that impairs ability to perform ADL's
- Key interventions for sarcopenia include aerobic and resistance exercise as well as increased daily dietary protein

MOBILITY

The primary goal of nursing care for the older adult with fragility hip fracture remains to maximize functional independence. Up to 50% of people recover their pre-fracture function following hip fracture while the remainder experience ongoing limitations in mobility, activities of daily living, and quality of life (Dyer, et al., 2016; Magaziner, et al 2003). These limitations may contribute to the observed increase in falls, long-term care admissions, and mortality after hip fracture (Doherty-King & Bowers 2013).

Patients define recovery as stable mobility (without falls/fear of falls) for valued activities after hip fracture (Griffiths, et al., 2015). Patients describe rehabilitation as key to this recovery (Schiller, et al., 2015; Bruun-Olsen, et al., 2018). However, the most effective rehabilitation program remains unclear. A series of Cochrane Systematic Reviews reported tendency towards better outcomes from multidisciplinary rehabilitation, (Handoll, et al., 2009) psychosocial rehabilitation (Crotty, et al., 2010), and dementia-specific enhanced rehabilitation (Smith, et al., 2015) after hip fracture surgery. All three reviews indicate insufficient evidence to recommend practice change based on small, heterogeneous trials with quality limitations. Researchers are addressing this evidence gap through new randomized controlled trials (e.g. Williams, et al., 2016; Lima, et al., 2016; Hammond, et al., 2017) and evaluation of national rehabilitation audits (Royal College of Physicians, 2018). Guidelines for rehabilitation after hip fracture are, therefore, limited to recommendations for: unrestricted weight bearing, mobilization on the day after surgery, and at least once a day thereafter (NICE, 2017).

Weight bearing

Patients with hip fracture often have limited functional capacity to overcome the stress of their fracture and the surgery to repair that fracture. Reduced weight bearing postoperatively limits these patient's potential to regain functional independence at 3-months (Kondo, et al., 2010) and 1-year post fracture (Ariza-Vega, et al., 2014b). Surgery should promote a protocol for full post-operative weight bearing (NICE 2017).

Early mobilization

In this context, mobilization is defined as any weight bearing activity, such as standing at the bedside, transfer from bed to chair, or walking. Proponents of early mobilization argue that longer waits affect recovery through loss of muscle strength at a rate of 5% per day of bed rest (Harper & Lyles, 1988). Longer waits are also associated with the occurrence of pneumonia and delirium after hip fracture surgery (Kamel, et al., 2003). Therefore, patients should begin mobilisation within 24 hours of surgery unless medically or surgically contraindicated (NICE, 2017). This process may begin with sitting at the bedside but should progress to standing within 24 hours of surgery (Beaupre 2011).

Daily mobilization

All patients should continue to mobilize at least once a day in order to achieve basic functional mobility for safe discharge from acute care (Beaupre 2011, NICE, 2017, Hulsbæk, et al., 2015). NICE 2017 indicated insufficient evidence to determine the exact dosing of mobilization. However, consensus pointed to potential benefits for improved mobility, balance and independence, and reduced need for institutional or social care from at least daily mobilization (NICE, 2017).

Factors affecting mobilization

Patients often fail to regain their pre-fracture function. This may be due to issues with access and delivery of acute care and rehabilitation, or to characteristics of the patient and their injury (Sheehan, et al., 2018). For the latter, regaining pre-fracture function may not be feasible. Indeed, hip fracture may be a component of declining function by virtue of aging (Chodzko-Zajko, et al., 2009). In this case, rehabilitation may be

considered a re-adaptive process, where the patient adapts his/her set of values to a different, more restricted life situation. To ensure rehabilitation is optimal for the individual patient, the multidisciplinary team should perform a thorough assessment to identify factors that may affect a patient's functional outcome. Family/caregiver involvement and patient beliefs and motivation, as well as determining education needs should complement this assessment (Copanitsanou, 2018).

A recent systematic review identified 33 observational studies of 25 prognostic factors of functional outcome at discharge from acute care following hip fracture surgery (Sheehan, et al., 2018). Factors were broadly classified as related to; demographics (age, sex, prefracture residence), injury (fracture type), comorbidities (Charlson Comorbidity Index, anemia on admission, cognitive function, Parkinson's Disease, prefracture function, diabetes, atrial fibrillation, polypharmacy, Vitamin D level), body composition (body mass index, malnutrition), complications (pain, elevated blood urea, perioperative urinary retention, pressure ulcers, delirium, emotional distress, new onset depression), and acute care (time to surgery, time to mobilization, length of stay). However, most factors were reported by studies with a high risk of bias. Anemia and cognitive function on admission were negatively associated with functional outcome at discharge from studies with a low overall risk of bias. Future interventions may target patients with anemia or cognitive impairment by intervening on these prognostic factors.

Qualitative studies identify additional barriers to mobilization after hip fracture surgery including: fear, confidence, expectations, beliefs about the benefits and risks of

activity, depression, lack of motivation, fatigue, and pain (Sihvonen, et al., 2009; Dennett, et al., 2012; Portegijs, E et al., 2012; Resnick et al., 2015). These factors should be addressed with the patient prior to and during mobilization. Gorman, et al., (2013) proposed determination and motivation for recovery, seeing improvements, and making exercise part of the daily routine as facilitators of mobilization. More upright time (i.e. standing and walking) at discharge is associated with reduced fear of falling (Kronborg, et al 2016). In a recent study by Münter, et al (2017), patients cited fatigue and pain as the most frequent reasons for not achieving independent basic mobility or not completing their planned rehabilitation during the first three post-operative days. Therefore, it is essential to coordinate adequate pain management and plans for the day prior to mobilization.

Nurse's role in mobilization

A recent national UK audit noted that patients are less likely to begin mobilization within 24 hours of surgery at weekends due to reduced rehabilitation staffing (Royal College of Physicians, 2018). Promotion of independent mobility is the responsibility of the entire multidisciplinary team. It should be incorporated early and into all aspects of care during the hospital stay. Examples include; activities of daily living (toileting, bathing, dressing) as well as transfers, avoidance of intravenous lines, pressure ulcer prevention, and sitting out of bed in a chair for all meals (Ariza-Vega, et al., 2014a; Beaupre 2011).

Nurses who take responsibility for mobilizing patients as part of their professional domain are more likely to initiate mobilization independently, promote

patient engagement with activities of daily living, and mitigate the risk for hospital-acquired functional decline (Boltz, et al., 2012; Doherty-King & Bowers 2013; Resnick, et al., 2015). Nurses can engage patients and their families using helpful information focused on preventing functional decline published by Nurses Improving Care for Healthsystem Elders (NICHE) (2017).

Mobility: Summary of Best Practice

- A patient loses 5% muscle strength for every day spent in bed
- Patients should mobilise within 24 hours of hip fracture surgery
- Patients should mobilise at least once a day during their hospital stay
- Mobilisation is the responsibility of the entire multidisciplinary team
- Nurses who claim responsibility for mobilising patients as part of their professional domain lessen the risk for functional decline

PAIN

Pain following a fall, hip fracture and surgical repair is distressing for the older person with the potential for serious adverse consequences. Older people with hip fractures are at high risk of under-managed acute pain after surgery. Poorly managed pain can result in impeded mobility, functional impairment and prolonged hospital stay with resultant increased healthcare costs (Chou, et al 2016; Björkelund, et al, 2009). Pain may also contribute to the development of delirium, depression, sleep and appetite disturbances (American Geriatrics Society, 2009).

Pain-related conditions and injuries increase with age and patients may have a combination of acute pain related to the fracture and surgical repair, as well as chronic pain related to a pre-existing condition. Among institutionalized people over age 65, up

to 80 percent suffer significant persistent pain and, in the community, up to 50 percent report persistent pain (Pickering, et al, 2016). Osteoarthritis, osteoporotic fractures, degenerative spine disease, cancer and diabetic or vascular neuralgias are some of the painful conditions prevalent in the older adult hip fracture population (Pickering, et al, 2016, American Geriatrics Society, 2009).

Pain is often under reported by older people and health professionals frequently underestimate and under treat their pain. Pasero and McCaffery (2011) note that older adults tend to under report pain for many reasons, including that they:

- Prefer a passive role in pain management, wanting to be asked about pain rather than complaining
- Fear being a burden or bothersome to staff or families
- Assume the nurse knows they are in pain and is doing all that can be done
- Believe that pain is inevitable with aging and are resigned to suffering
- Fear that admitting pain could result in loss of autonomy as family may insist on added care or institutionalization
- Have previously experienced side effects such as constipation and sedation and wish to avoid analgesics
- Fear becoming addicted to opioids
- Are unable to communicate clearly due to cognitive impairment, or a language barrier
- Have an illness such as Parkinson's or dementia that may mask typical facial or verbal pain expressions.

Healthcare providers may also hold misconceptions or lack knowledge that hampers pain detection and treatment, such as erroneous beliefs that:

- Pain is normal, harmless and an inevitable part of aging
- Visual signs: either physiological (elevated vital signs) or behavioral (grimacing, moaning etc.) must accompany pain
- A cognitively impaired person is incapable of reliably reporting pain
- Cognitively impaired patients do not experience as much pain as those who are cognitively intact
- Older adults experience lower pain intensity.

Identifying, discussing and dispelling misconceptions held by patients and health professionals are essential for improving pain management (Pasero & McCaffery, 2011). Improving pain knowledge and assessment skills across the spectrum of health care providers from care aides to physicians would improve care significantly.

Pain classifications

Understanding pain classification is essential so that targeted interventions may be selected to more effectively address a specific pain type. Pain is classified based on duration and physiology, as delineated below.

Duration

- Acute short-term pain, related to an illness or injury with a predictable course of healing. For example, surgical pain that subsides in the weeks following surgery is acute pain.

- Persistent/chronic pain lasting at least two weeks or often much longer.

Degenerative joint and spine diseases are examples of painful conditions that tend to persist long term.

Physiology

- **Nociceptive pain**, which has two subtypes:

1) **Somatic**: involving skin and musculoskeletal structures. Somatic pain tends to be well localized and is typically characterized as aching, sharp or throbbing pain that is intensified by movement. Osteoarthritis and fractures are common forms of somatic pain.

2) **Visceral**: involving injury or inflammation of organs and the GI tract. This is often characterized by a deep, dull ache or cramping. Visceral pain tends to be poorly localized and frequently radiates to surrounding structures. Constipation is an example of a common visceral pain in the older adult (Pasero & McCaffery, 2011; RNAO, 2013).

- **Neuropathic pain** is associated with injury or disease of the peripheral or central nervous system (Pickering et al, 2016). It can be caused by; degeneration, pressure, inflammation, trauma, metabolic disorders, tumors, primary neurological disease or infection. The intensity of nerve pain varies from mild to severe and is described as any one or a combination of the following: 1) dysesthetic, pins and needles, burning or freezing, 2) lancinating, “sharp, shooting, shock like”, or 3) allodynia, pain in response to non-painful stimuli.

Common causes of neuropathic pain include spinal compression fractures and diabetic neuralgia (Pickering, et al, 2016; RNAO, 2013).

The patient with a hip fracture may have several overlapping pain types. For example, they experience pain at the injury/surgical site, but may also have chronic constipation (visceral nociceptive) and an osteoporotic spine fracture with nerve compression. Identifying all presenting pain types is necessary as effective management strategies vary depending on the pain type.

Assessment/detection

Pain is a multidimensional experience influenced by physical, emotional, psychological, and social factors. The most accurate and reliable means of determining the presence and severity of pain in the cognitively intact patient is self-report (Pasero and McCaffery, 2011; Chou, et al, 2016).

Frequent evidence-based pain assessment is the foundation of effective pain management. Standards for pain assessment include using an evidence-based tool to conduct an admission interview and screening of health records as well as interviews with family/care providers to detect pre-existing painful conditions.

An initial assessment usually includes:

- Location of pain(s), pain descriptors/characteristics of both new/acute and existing persistent pain
- Pain intensity rating at rest and during activity

- Pain management history – current and past pharmacological and non-pharmacological strategies, their effectiveness and any adverse effects experienced by the patient.

Pain intensity rating scales identify the intensity of the pain and serve as a measure for the effectiveness of the pain intervention in relation to the individual's pain goal. In studies of long term care residents, individual preference and ability to respond varied by scale. Preferred tools include the: numerical rating scale (0-10), faces pain scale, verbal descriptor scale and IOWA Pain Thermometer (Pasero and McCaffery, 2011; RNAO, 2013). Identification and consistent use of the patient's preferred pain rating tool is recommended when a range of acceptable options are available.

For ongoing pain assessment, the following mnemonic is easy to remember and may be useful:

- **O – onset** and duration of pain
- **P - provoking** - what make it worse or **palliating** - what makes it better
- **Q - quality** what does the pain feel like e.g. discomfort, aching, burning etc.
- **R – radiation and region**
- **S - severity** or pain intensity measured on a validated scale
- **T - timing**
- **U - understanding:** Patient or family beliefs or concerns about the pain
- **V - values:** • What is the patient's goal for pain relief?

(RNAO, 2013)

Not all older adults will use or respond to the term 'pain' when assessed. The use of other descriptors such as discomfort, aching or hurting may assist in revealing the presence of pain (American Geriatrics Society, 2009; Pasero and McCaffery, 2011).

Special considerations

Older adults frequently have vision and hearing deficits and may be slow to comprehend information. Addressing any sensory impairment (hearing aids and glasses in place, enlarged pain rating tools, adequate lighting) and providing sufficient time for older adults to process and respond to questions is essential.

Even in the presence of mild to moderate dementia or delirium, patients can reliably report pain through simple questions and valid assessment tools (Herr, 2011).

Patients with advanced cognitive impairment require systematic assessment using a validated behavioral scale. Validated behavioral pain scales typically involve observing the patient at rest and during movement to note changes in behaviors that may indicate pain. An example of a validated tool is the PAIN AD that can be found at:

<https://consultgeri.org/try-this/dementia/issue-d2.pdf>.

Evaluation of changes in usual behaviors such as increased agitation, aggression, guarding or withdrawal may indicate pain as a potential cause. When signs of distress are evident, sources other than pain should also be assessed and addressed. These may include: positioning, hunger, thirst, heat, cold, over or under stimulation, toileting needs etc. Family/care providers are an important source of insights into patient behaviors or responses indicative of pain or discomfort (RNAO, 2013). Patients who

manifest pain with agitation or combativeness may be at risk of inappropriate treatment with psychotropic medication for behavior management rather than interventions to address the pain. Rule out pain as the cause of unsettled behaviors prior to administering psychotropic medications.

If the patient has a pre-existing condition, such as spinal osteoporosis, that increases the risk of neuropathic pain, or when pain is not responding to usual analgesics, assessment using a validated neuropathic pain scale is recommended (Pickering, et al 2016). As depression frequently co-exists with persistent pain, using a validated screening tool may assist in its diagnosis and management where concern exists. Identifying and managing untreated depression is important as pain contributes to depression and depression makes pain more difficult to bear. A depression screening tool can be found at: www.painbc.ca - search under the tab: "Health Care Professionals" and then "assessment tools".

Management strategies

Effective pain management is dependent on accurate assessment of pain and a holistic approach that includes non-pharmacological and pharmacological methods for treatment (Chou, et al 2016; RNAO, 2013). Partnering with the patient and family is vital to managing the patient's pain. Understanding and addressing the patient's preferences, goals, fears and biases are essential in crafting a care plan that will engage the patient as a partner (Chou, et al, 2016).

Non-pharmacological interventions

Non-pharmacological therapies are integral to the treatment plan and several of these are proven effective as stand-alone treatments or in combination with analgesics. Selecting strategies that the patient believes in will enhance the effectiveness of pain management. Recommended therapies include, but are not limited to:

- Applying ice packs to the hip for fifteen minutes at a time
- Warm blankets and gentle massage to help reduce anxiety and provide a feeling of safety and well-being
- Cognitive-behavioral strategies: breathing and relaxation exercises, humor, music therapy and socialization/distraction
- Repositioning regularly and supporting with pillows
- Interdisciplinary approaches:
 - Occupational therapists may provide custom seating, splints or adaptive devices
 - Physiotherapists may offer individualized mobility, exercise and strengthening strategies
- Physical activity to improve range of motion, mobility and strength.

(American Geriatrics Society, 2009)

Pharmacological strategies

A multimodal approach to analgesia is recommended to maximize the synergistic benefits of selected medications while at the same time reducing opioid requirements

and minimizing their adverse effects (Chou, et al 2016; Abdulla et al 2013). The use of two or more analgesic medications with complementary mechanisms of action, as opposed to higher doses of a single pain medication, may lead to greater relief of pain with less toxicity (Makris, et al., 2014) and may facilitate a more rapid recovery with fewer complications (Fabi, 2016).

Older adults are more susceptible to adverse medication effects. However, analgesics can be used safely and effectively in the older adult population when age-related changes and individual risk are considered in the dosing and selection of medications (American Geriatrics Society, 2009). A 2017 Cochrane review (Guay, et al, 2017) offered strong evidence that those patients with hip fractures who have local nerve blocks have superior pain control, earlier mobility and a lower incidence of pneumonia than those with oral or parenteral analgesic regimes. Regional blocks administered pre-operatively by specially trained physicians or nurses as either one-shot or a continuous infusion have proven to be effective at relieving pain and improving function (Morrison, et al, 2016).

Opioid analgesia is often required to help manage hip fracture pain, but careful dosing and opioid selection are critical. Opioid use can impede mobility, impair cognition and interfere with recovery. Opioid requirements decrease with aging, but there is wide variability in individual response to analgesics. Analgesic names and their availability vary by country, so there will be differences regarding specific analgesics used. There is a lack of studies supporting any one specific opioid, however those with shorter half-life and without toxic metabolites, such as hydromorphone and oxycodone

are considered more appropriate. Morphine has a potent active metabolite and therefore is not the first choice for older patients with decreased renal function (Chou, et al, 2016). Meperidine/pethidine/ is contraindicated due to active, toxic metabolites (Pasero and McCaffery, 2011).

While COX-2-selective and traditional non-steroidal anti-inflammatory drugs (NSAIDs) are effective agents in postoperative musculoskeletal pain management, older adults are at high risk of associated cardiovascular and gastrointestinal adverse events. People with diminished renal function, dehydration, congestive heart failure and/or a history of peptic ulcers or gastrointestinal bleeds should not take these medications. Traditional NSAIDs can enhance the anticoagulant action and increase the risk of bleeding due to their effects on platelet function. Therefore, NSAIDs are used with extreme caution and only if benefits outweigh risks and are not generally recommended for the older adult (American Geriatrics Society, 2009).

Medications such as sedatives and neuroleptics to manage agitation may potentiate opioid sedation and need to be considered when dosing and titrating opioids (Jarzyna, et al, 2011). Antiemetic medications should be used with caution due to their anticholinergic actions that may lead to over-sedation and delirium (American Geriatrics Society, 2009).

Specific multimodal analgesic recommendations for older adults in the immediate postoperative period include:

1. Regional nerve blocks, in particular Fascia Iliaca Block, administered perioperatively (Scurrah, et al 2017; Kassam, et al 2018, Amin, et al 2017).

2. Regularly scheduled administration of acetaminophen, for up to 14 days postoperatively and then as needed. For those with diminished renal or hepatic function, decrease the adult dose by 50 to 75 percent (American Geriatrics Society, 2009).
3. Low dose opioids for breakthrough pain titrated to effect, for the first 48 to 72 hours post operatively and then as needed (RNAO 2013).

For neuropathic pain, antidepressants, anticonvulsants and other pain modulating medications are recommended with selection and titration based on the pain type, severity and response to treatment (Pickering et al, 2017). However, careful selection and monitoring of agents is essential as a number of antidepressants and anticonvulsants have severe side effects for this age group and, according to the 2015 Beer Criteria (AGS 2015), are best avoided.

The American Geriatrics Society Panel Pharmacological Management of Persistent Pain in Older Person 2009 (American Geriatric Society, 2009) can be accessed at: http://www.americangeriatrics.org/files/documents/2009_Guideline.pdf.

Prevention and management of Opioid induced side effects

Anticipate and monitor for common side effects such as sedation, constipation, nausea and vomiting and institute preventive treatment as appropriate (RNAO, 2013). The older adult has an increased risk of respiratory depression with opioids due to age-related changes and coexisting diseases. Regularly monitoring sedation levels is recommended as sedation generally precedes respiratory depression (Jarzyna, et al, 2011). The Pasero Opioid Induced Sedation Scale is a valid and reliable tool (Pasero, 2009).

Self-Management Strategies

Engaging patients and families in developing the capacity to manage their pain is vital for effective pain treatment and improved quality of life. Consider education and coaching to develop self-care knowledge and skills in the following areas:

- Importance of pain management for mobility, rest, and healing
- How to use non-medication strategies: e.g. cold packs, positioning, breathing exercises, distraction etc.
- Preventing pain with appropriate selection, dose and timing of pain management strategies e.g. analgesics and or cold packs before exercise
- Safe and appropriate use of analgesics: e.g. what medication to take, when and how to take them, and any activity precautions
- Preventing analgesic side effects: e.g. constipation, delirium, sedation
- Pain presentations symptomatic of complications that require medical assessment: e.g. infection, venous thromboembolism, hip dislocation etc.

The Fresh Start Tool Kit for Hip Fracture Patients and Families addresses this content and is available for down load at www.hiphealth.ca ; type “Fresh Start Toolkit” into the Search window. This information is available in English, French, Korean, Farsi, Pujabi, and simplified Chinese.

<h4>Pain: Summary of Best Practice</h4>

- | |
|--|
| <ul style="list-style-type: none"> • Older patients with hip fracture are at high risk of under-managed acute and |
|--|

chronic pain

- Pain is often under reported by older patients resulting in health professionals frequently underestimating and under treating their pain. Use of other terms such as discomfort, aching or hurting may be helpful.
- The most accurate, reliable means of determining presence and severity of pain in the cognitively intact patient is self-report.
- Patients with mild to moderate dementia or delirium can reliably report pain
- Frequent evidence-based pain assessment is the foundation for effective pain management.
- A multi-modal approach to pain management is recommended.

DELIRIUM

Delirium is a cognitive disturbance prevalent in older adults with hip fracture with rates ranging between 16% and 62% (Bitsch, et al 2004; Edelstein, et al.,2004). Defined as a sudden alteration in baseline cognition, delirium is characterized by rapid development of fluctuating disturbances of consciousness, attention and perception (American Psychiatric Association, 2013). It is well known that delirium is independently associated with a variety of adverse outcomes including; pressure ulcers, functional decline, institutionalization, and death. A recent study of over 350 patients with hip fracture found that those who developed post-operative delirium had longer lengths of stay and

greater risk of 1-year mortality (Tahir, et al., 2018). Patients with persistent delirium are 2.9 times more likely to die within one year than those whose delirium resolves (Kiely, et al, 2009). In addition to increased morbidity and mortality, there is significant added monetary cost per case to treat and care for patients with delirium due in part to longer hospital stays and need for increased post discharge services (Leslie & Inouye, 2011).

Despite its prevalence, significant cost and negative outcomes, delirium is often over looked or misdiagnosed by both physicians and nurses (Schuurmans, et al., 2001; Inouye, 2001; Lemiengre, et al, 2006; Steis, et al., 2012). Rather than referring to a patient as experiencing delirium, clinicians often use nonspecific terms such as 'pleasantly confused', 'sundowners', 'fidgeting' and 'agitation' to describe the behaviors associated with delirium (Milisen, et al. 2002). Differentiating between dementia and delirium can be challenging. Delirium superimposed on dementia is a common occurrence of which prevalence rates range from 22% to 89% (Fick, al, 2013). Teasing apart these two conditions is critical because, unlike dementia, the cognitive changes associated with delirium are potentially preventable, are likely to be reversible, and may be the only presenting symptom of an acute health crisis. Identification of delirium requires an awareness of baseline cognitive function. For patients with dementia, delirium prevention interventions should be proactively initiated on admission and any change in cognition should be considered delirium until proven otherwise.

Nurses play a pivotal role in ensuring optimal outcomes for patients at risk for or suffering from delirium. Preventing delirium requires clinicians that are knowledgeable

of risk factors, are vigilant in screening and documenting their findings, and proactive in initiating evidence-based protocols to prevent and/or reduce the incidence of delirium.

In the older adult, delirium is considered a medical emergency requiring prompt attention, ongoing assessment, and targeted medical and nursing interventions aimed at addressing the causative issue.

Risk factors

Multiple factors including dementia, advanced age, sensory deficits, chronic medical conditions, medications and surgery increase the risk of developing a delirium in the older patient with hip fracture (Yang, et al, 2017). Unfortunately, there is no single laboratory 'test' for delirium. Detection depends on knowledgeable care providers who identify the risk factors and maintaining a high level of suspicion when sudden behavioural changes occur, including increased somnolence and lethargy. Many years ago, Inouye and Charpentier (1996) identified two categories of risk factors for delirium; predisposing risk factors, those issues that increase a person's vulnerability to developing delirium, and precipitating risk factors, those issues that occur as a result of hospitalization that lower the threshold to trigger delirium. See Table 1 for examples of predisposing and precipitating factors. The more vulnerable the patient, the fewer precipitating factors are required to create a delirious state.

Insert Table 1 near here

While there is no single cause of delirium, it is well-proven that targeting and managing risk factors is an effective strategy for reducing the incidence, duration and severity of delirium. (Holroyd-Leduc, et al, 2010; Björkelund, et.al, 2010; Akunne, et al, 2014).

Cognitive assessment

Determining baseline mental status is a critical, and often challenging, first step in obtaining an accurate assessment of cognition. The best resource to determine mental status changes, especially for those with dementia, is often the family or home care provider. In addition to information from patient and family, a formal cognitive assessment, with documentation of findings, is a priority. Embedding a cognitive assessment screen into daily nursing documentation may help to ensure on-going evaluation across shifts, enhancing the opportunity to detect subtle changes. The Abbreviated Mental Test 4 (AMT4) and the Short Portable Mental Status Questionnaire are examples of valid, reliable and easy to administer tools that can be used to identify cognitive deficits (Schofield, et al 2010; Swain & Nightingale 1997).

Assessment of Delirium

The fluctuating nature of delirium symptoms makes it a challenging condition to recognize. There are several delirium assessment and rating scales to assist clinicians in identifying delirium. All these instruments were developed based on criteria identified by nurses as symptoms of delirium. Some require specialized training prior to use, but others are based on nursing observations, so they are easier to implement. The Confusion Assessment Method (CAM), The Delirium Observation Screen (DOS) and the NEECHAM confusion assessment scale have demonstrated validity in identifying delirium. Another assessment measure involving the family is the Family Confusion

Assessment Method (FAM CAM), which is a sensitive screening tool for detection of delirium in elderly adults with cognitive impairment involving family caregivers (Steis & Fick, 2012).

In addition to these established assessment tools, several studies have reported positive findings using the '4AT', a rapid screening tool for delirium (Shenkin, et al, 2018; Baird & Spiller, 2017; De, et al, 2017). The 4 AT is a brief, easy to use, validated tool to identify moderate to severe cognitive impairment, and/or the presence of delirium, and requires minimal training to use (Bellelli, et al, 2016). It can be used as both an initial screening and as a daily assessment tool to monitor delirium and includes assessment of patients with severe drowsiness or agitation. The tool consists of four sections that are scored and then totalled. The sections assess alertness, orientation using the AMT4, attention and acute change in cognition. The tool is free to use, a copy can be found by searching "4AT".

Whatever the tool used, when delirium is suspected an in-depth assessment to uncover the root causes should be performed. PRISME is a framework that was developed by the British Columbia Centre for Palliative care (2017) to help focus nursing assessment on common risk factors that may be contributing to the delirium:

P - Pain, Poor nutrition

R - Retention (urine or stool), Restraints

I - Infection (Urinary, pulmonary, wound), Immobility

S - Sleep disturbances, sensory deficits (hearing, vision)

M - Metabolic imbalance, mental status, medications

E- Environmental changes

Differentiating Delirium from Dementia and Depression

Delirium is more common in patients with dementia and may coexist with disorders such as depression, a common condition in the elderly (Fick, et al, 2013). Cognitive changes, such as increased anxiety, visual hallucinations, delusions, pulling/picking at devices, are often attributed to the dementia rather than an emerging delirium superimposed on the dementia.

Adding to the complexity, delirium presents in several forms or subtypes. The hyperactive form is characterized by high levels of anxiety, distractibility, restlessness and wandering. Patients suffering from this form of delirium are easy to identify as they demand attention. The hypoactive subtype is a common form of delirium in older adults and is associated with poorer outcomes and an overall poorer prognosis (O'Keefe & Lavan, 1999). Patients experiencing hypoactive delirium may be misdiagnosed as sedated, tired, or suffering from depression. The mixed subtype manifests with fluctuating periods of anxiety and lethargy. Differentiating delirium from depression or dementia requires astute assessment skills and an awareness of the distinguishing clinical features of each condition. (see Table 2).

Insert Table 2 near here

Prevention

Studies suggest that it is possible to prevent delirium (Marcantonio, et al., 2001; Hsieh, et al. 2018). Awareness of risk factors and early multidisciplinary implementation of targeted management strategies may avert the development of delirium and/or ameliorate its severity (Marcantonio, et al, 2017). Table 3 provides examples of targeted interventions. A comprehensive list of delirium prevention strategies published by the National Institute for Health and Clinical Excellence (NICE, 2010) are available at the following website: <http://www.nice.org.uk/nicemedia/live/13060/49909/49909.pdf>

Insert Table 3 near here

It is important to remember that delirium is a frightening experience for the patient, their family and clinical staff. Cognitively intact older adults who experienced a delirium while acutely ill or following surgery may vividly recall their feelings while delirious and how frightened they felt. Such is the power of these experiences that many individuals, care institutions and health professionals have begun to utilise the Internet to share these experiences. Guys and St Thomas NHS trust in the United Kingdom has developed, and kindly shares, the link to a video depicting a delirious episode from the patient's perspective. Videos such as this can be used to inform staff of the significant impact of delirium from a first hand patients' perspective.

<https://youtu.be/dPL1olMqJX8>

Nursing management strategies to reduce severity of delirium

Once delirium has been identified, the focus of nursing care is maintaining safety and reducing of stress. The initial management strategy is to identify and manage any possible underlying cause or combination of causes (Robinson & Eiseman, 2008). Potentially inappropriate drugs should be withdrawn whenever possible. Benzodiazepines and medications with anticholinergic properties should be critically evaluated for necessity and dose. If the suspected cause of delirium is opiates, it may be possible to reduce the dose or change to an alternative analgesic. However, it is important to note that hip fractures are painful and pain is a leading cause of delirium. A review of medications by a clinical pharmacist is often helpful in identifying medications that may be contributing to delirium.

Infection is another precipitant of delirium. Strict adherence to universal precautions should be maintained to prevent infections. Avoid the use of devices that increase the risk of infection; indwelling urinary catheters should be discouraged and removed as soon as clinically possible. If urinary retention presents as a postoperative symptom, rather than reinserting an indwelling catheter, all efforts should be made to mobilize the patient and consider the use of bladder scan and intermittent straight catheterization, until normal voiding returns. (Palese, et al, 2010) Always assess for the possibility that an anti-cholinergic drug may be at the root of causing the retention. In men, determine whether an enlarged prostate is the cause and refer for appropriate urological advice.

Alcohol abuse is an often overlooked risk of developing delirium in older people. Incorporation of a protocol to manage chemical dependency withdrawal, such as the

Clinical Institute Withdrawal Assessment (CIWA) may help ensure symptoms of withdrawal are identified and addressed early (Sullivan, et al, 1989). Drug misuse such as benzodiazepines for sleep or anxiety may also be a contributing factor. Failure to renew these medications while hospitalized may lead to withdrawal. Withdrawal is potentially a life threatening condition requiring a challenging issue needing assessment by a physician or advanced practice nurse to determine appropriate management. ~~which may involve continuance of the drugs while in the hospital may be necessary.~~

Communication

Effective communication is important and often overlooked as an essential component of care when a patient is acutely delirious and unwell. It is important to provide reorientation. Explaining where the person is, your role, use of a white board to post date, room number and the names of persons providing care etc. are all important reorientation strategies. Invite and encourage participation of family, friends and home carers as they bring the element of familiarity. Provide a therapeutic care environment by ensuring adequate lighting, appropriate noise and temperature control, and remember to provide reassurance to both the patient and family to allay their fears.

Families should be encouraged and supported to remain present as long as their presence is calming to the patient. It is important to provide families with information about the nature of delirium and the important role family members play in providing a sense of security and comfort. Patients who have previously experienced delirium are at

increased risk for reoccurrence so advise families and patients of the value of reporting prior episodes of delirium and strategies that were effective in its resolution.

Teaching patients and families how to detect and report the early warning signs of delirium is also important. Nurses Improving Care of the Health System Elders (NICHE) has developed information for patients and families related to delirium, hip fracture surgery and aftercare in partnership with the International Collaboration of Orthopaedic Nursing (ICON) as part of their “Need to Know Series”. These resources can be found on the NICHE website at <https://nicheprogram.org>.

Patients with hip fracture may be transferred to a rehabilitation facility upon discharge from the acute care setting; information regarding delirium assessment and effective management strategies must be included in the “handoff” plan of care.

Given its complexity, and despite our best efforts, occasionally delirium does not resolve. When this happens, consider:

- Re-evaluation of underlying causes
- Follow-up referral to appropriate geriatric practitioners for a comprehensive assessment
- Continuous provision of supportive care to patient and family
- Short-term pharmacological management if behaviour interferes with treatment.

Pharmacological management

The use of medications to manage the hyperactive symptoms of delirium should be reserved for those occasions where more conservative measures, such as verbal and non-verbal de-escalation techniques, have failed. People who may benefit from short term medication use tend to be those who are distressed, actively experiencing hallucinations or delusions, extremely agitated, or considered a risk to themselves or others and for whom verbal and non-verbal de-escalation techniques are ineffective or inappropriate. When medications are warranted, administration of the lowest clinically appropriate dose, with cautious titration to manage symptoms while maintaining wakefulness, is recommended.

A systematic review of the literature found that the use of low dose typical (first generation) antipsychotics such as haloperidol (<3.0 mg/day) as well as atypical (second generation) antipsychotics such as olanzapine, quetiapine or risperidol are equally effective for the management of the symptoms of delirium (Campbell, et al., 2009). Older adults have an increased sensitivity to antipsychotics and monitoring for adverse events such as extrapyramidal symptoms and neuroleptic malignant syndrome (NMS) is important. NMS is a potentially fatal adverse effect that must be quickly recognized and promptly treated,. www.uptodate.com/contents/neuroleptic-malignant-syndrome.

Benzodiazepines, such as lorazepam, are only recommended in cases where delirium is a result of alcohol or benzodiazepine withdrawal. The use of benzodiazepines in older people must be critically evaluated due to the known potential to cause paradoxical agitation and falls (Nicholson & Henderson, 2009)

Putting it into practice

Delirium is a complex problem requiring a high degree of clinical expertise to identify at-risk patients. Failure to proactively implement prevention strategies for those with identified risk factors will result in costly outcomes for patients and the healthcare system. If in doubt about the cause of an acute change in cognition, assume it is delirium until proven otherwise.

Given the relative connectivity of worldwide health services, it is now possible to view much of the work undertaken on delirium management by other centres and services, allowing individual practitioners and healthcare providers to benefit from others' experience and practice. The links below provide examples of how healthcare providers, in Canada and the United Kingdom, are looking to inform, support and advise on delirium detection and management. Some of these resources are in the form of instructional videos for professionals, patients and carers, with others providing guidance and management, with free to use assessments and paperwork to support practice.

Vancouver Island Health Authority. Delirium resource.

- <http://www.viha.ca/search.htm?q=delirium&ChannelGuid=%7bAB3EE633-0F65-4C25-8C40-6502866E96DF%7d>

Guys and St Thomas NHS foundation trust. Barbara's story. An educational resource detailing the care of an older patient in hospital with cognitive impairment.

- https://youtu.be/DtA2sMAjU_Y

An example of patient/carer information and clinical guidelines.

- <https://www.guysandstthomas.nhs.uk/resources/patient-information/acute/delirium.pdf>
- <https://www.guysandstthomas.nhs.uk/resources/our-services/acute-medicine-gi-surgery/elderly-care/delirium-adult-inpatients.pdf>

Delirium: Summary of Best Practice

- Delirium is a common, complex, serious, costly and under recognised complication for older persons undergoing treatment for hip fracture
- Heightened attention to the risk factors and the proactive implementation of prevention strategies may reduce the incidence of delirium
- Routine Nursing assessment with an evidence-based screening tool allows for early identification of subtle changes suggestive of delirium. Care plans should focus on interventions that restore the patient's pre-fracture functional level
- If delirium is present, prompt implementation of evidence-based nursing management strategies can ameliorate its severity and duration

PRESSURE ULCERS/INJURIES

Pressure ulcers/injuries (PU/PI) are common and present a major challenge for patients with hip fracture. Despite the fact that prevention strategies have been disseminated widely, the prevalence of pressure ulcer/injury remains high (Vanderwee, et al, 2011; Bååth, et al, 2014). Pressure related skin breakdown following hip fracture surgery is estimated to occur in 12% of patients (Magny, et al, 2017). These largely preventable wounds cause suffering for the patient (Gorecki, et al, 2009) increase health care costs (Demarré, et al, 2015) and are associated with long term mortality (Magny, et al, 2017).

Definition

A pressure ulcer is a localized injury to the skin and/or underlying tissue usually over a bony prominence, resulting from pressure or pressure in combination with shearing forces (NPUAP-EPUAP-PPPIA, 2014). In 2016, the National Pressure Ulcer Advisory Panel (NPUAP) replaced the term pressure ulcer (PU) with pressure injury (PI) in NPUAP's staging system. According to the NPUAP, pressure injury is a more accurate description than pressure ulcer because some presentations of the phenomena are not open ulcers. There is an ongoing discussion in the European Pressure Ulcer Advisory panel (EPAUP) and the Pan Pacific Pressure Injury Alliance (PPPIA) regarding changing their terminology but, there is still no consensus so both terms will be used in this document as PU/PI.

Risk factors

The probability of pressure ulcer/injury development increases with the duration and magnitude of the force acting on the tissue. Shearing greatly increases the risk of PU/PI development because it leads to tissue ischemia that further reduces tissue tolerance to pressure. Inability to reposition the body, often present in older people, is an additional variable (Moore and Cowman, 2009).

While pressure and shearing forces are the causative factors in PU/PI development, tissue tolerance is a key variable (Defloor and Grypdonck, 2004). The tolerance of soft tissue to pressure and shear may also be affected by microclimate, nutrition, perfusion, co-morbidities and the condition of the soft tissue (NPUAP, EPUAP, PPPIA, 2014).

Another risk factor is prolonged exposure to moisture that can result in moisture

associated dermatitis (MSAD) (Black, et al, 2011). If the patient is incontinent, prolonged exposure to moisture of the skin to urine and/or faeces may lead to incontinence associated dermatitis (IAD) (Beeckman 2017). Prolonged exposure to other sources of moisture such as diaphoresis in skin folds may result in a condition referred to as intertriginous dermatitis (ITD). These moisture-related conditions are sometimes mistakenly identified as a pressure injury.

Common risk factors for PU/PI in patients with fragility hip fracture include: advanced age, prolonged time on the operating table (Houwing, et al, 2004) and delay to surgery, specifically delay between admission to the hospital and time to surgery (Haleem, et al., 2008). Patients operated on within 24 hours of admission develop significantly fewer PU/PIs (Al-Ani, et al, 2008; Hommel, et al, 2007).

Additional risk factors include, co-morbidities such as diabetes (Wei, et al 2017), respiratory disease, low hemoglobin, low systolic blood pressure, altered mental status (Lindholm, et al., 2008; Moore and Cowman, 2009; Campbell, et al., 2010) and poor nutritional status (Dreyfus, et al., 2017). The results of a meta-analysis comparing hip fracture patients with and without diabetes, found that the mean PU/PI incidence following hip fracture was 15.1% compared to 7.5% in patients without diabetes (Wei, et al., 2017). Comparing patients with and without malnutrition, Fry, et al, (2010) found that malnourished patients were 4.8 times more likely to develop a PU/PI.

Assessment/detection

Prevention of pressure ulcer/injury is a surrogate marker for quality of nursing care (<https://www.nursingquality.org/>). Early and ongoing assessment of risk with a validated risk assessment tool coupled with proactive implementation of prevention interventions are essential elements of an effective PU/PI prevention program. Prompt attention to risk is imperative because PU/PI can develop rapidly in this vulnerable population.

Head to Toe Skin assessment

Skin assessment is a process that examines every part of the body surface for abnormalities. With consent of the patient, the nurse looks at and touches the skin from head to toe, particularly over bony prominences and any tissue subjected to prolonged pressure such as the sacrum and buttocks.

Any disruption in skin integrity present on admission should be documented. This should then be used to develop a plan of care to treat ulcers/injuries and to monitor their status. The patient should be asked about any areas that are painful or uncomfortable as sensory changes may precede tissue breakdown.

A comprehensive skin assessment includes five elements:

- Temperature
- Color/discoloration
- Moisture level
- Turgor

A resource detailing each of these components can be found at:

<https://www.ahrq.gov/professionals/systems/hospital/pressureulcertoolkit/putool7b.html#Tool3B> Elements of a Comprehensive Skin Assessment

Pressure ulcer/injury risk assessment

The goal of pressure ulcer/injury risk assessment is to identify those individuals who are more likely to experience skin breakdown so that preventive care can be planned and implemented. A PU/PI risk assessment tool is used to establish a risk score based on a series of risk factor criteria. A local policy or protocol, based on best practice evidence, should guide the clinician on the frequency with which risk assessment is to be performed. Any change in the patient's condition requires reassessment of risk (NPAUP -EPUAP -PPPIA, 2014). An international audit of nursing quality indicators for the care of patients with fragility hip fracture reported that the majority of hospitals audited have a nursing policy requiring daily and ongoing assessment of PU/PI risk using a validated assessment measure (McDonald, et al, 2018).

There are several validated risk assessment measures available. The Braden Risk Assessment Scale is most frequently used in research and, along with the Norton Scale, is recommended by the Agency for Health Care Research and Quality (AHRQ). The following link provides a summary of both the Braden and the Norton risk assessment measures.

www.ahrq.gov/professionals/systems/hospital/pressureulcertoolkit/index.html and scroll down to Tool 3D and 3E.

The majority of older adults with hip fracture will undergo a surgical repair of their fracture. Surgery is a significant risk factor for PU/PI development. The Association of PeriOperative Registered Nurses guidelines state that PU/PI assessment and prevention measures should be performed in the perioperative setting. The Perioperative Risk Assessment Measure for Skin (PRAMS) is an example of a validated risk assessment measure specific to the perioperative population (Meehan, et al., 2016).

Prevention strategies

Although it is universally agreed that PU/PIs can be prevented and even though guidelines are available, pressure injuries remain a significant problem for hospitalized patients (Sving, et al, 2014). Samuriwo (2010) suggests that nurses who place a high value on pressure ulcer prevention appear to be more proactive and determined to deliver care that protects their patients' skin.

Essential factors in preventing hospital-acquired pressure ulcers/injuries (HAPU/I) include; pressure ulcer/injury prevention as an organizational priority, maintaining persistent awareness and realizing the benefits for patients (Hommel, et al, 2017). Post-surgical inspection of the dependent side (e.g. back if in supine position or non operative trochanter if in the lateral position) is essential as prolonged periods of immobilization while under anesthesia is a known contributor of PU/PI development. Meehan, et al., (2016) report on a perioperative pressure injury protocol that includes a communication tool designed to alert staff nurses to areas that were under pressure during surgery.

Several programs reported in the literature use the 'skin champion' model and the concept of peer-to-peer learning and teaching as an effective strategy to prevent HAPU/HAPIs. (Carson, et al, 2012; Beinlich & Meehan, 2014). Prevention protocols should consider using pressure redistributing/relieving surfaces for high risk patients across the care continuum; on nursing units, in the operating theatre, and in the emergency department (Beckett, 2010; Pham, et al., 2011). There is an emerging body of evidence demonstrating the effectiveness of multilayered foam dressings over bony prominences, specifically heels and sacrum, to prevent PU/PI in at-risk patients. A pragmatic randomized study of 359 hip fracture patients found that those patients who received standard prevention, plus multilayered foam dressing, developed fewer sacral pressure ulcers/injuries than those who received only standard prevention interventions. ($p=0.001$). (Forni, et al 2018)

It is important to remember that despite best efforts, occasionally, PU/PI development is an unavoidable consequence of multiple organ failure, end of life or pre-admission circumstances, such as a patient who has fallen and was lying on a hard surface for many hours prior to hospital admission (Edsberg, et al, 2014). Even in such circumstances, however, clinical teams need to demonstrate that best practice in prevention has been implemented.

Pressure reducing support surfaces

Reducing the amount, duration and intensity of pressure exerted on the skin is the most effective strategy for pressure ulcer prevention (Sakai, et al., 2009). Support surfaces aim to enhance pressure distribution over a larger area and may have an impact on skin

microclimate. However, care providers must be aware that patients must be repositioned even when placed on advanced surfaces. Heels must be off-loaded at all times, as these surfaces are not able to provide effective pressure relief to prevent tissue injury at the heel (Tomova-Simitchieva, et al., 2017). Individuals at high risk of developing PU/PI should be placed on a pressure-relieving surface. The type of pressure relieving surface that provides the optimal pressure relief or redistribution remains unclear, choices include an alternating-pressure mattress or a constant low-pressure mattress.

Repositioning

Repositioning is an essential aspect of prevention, aiming to relieve or redistribute pressure. The frequency of position changes should be adjusted to the condition of the individual and the support surface in use (NPUAP-EPUAP-PPPIA, 2014). Mallah, et al., (2015) found that compliance with repositioning was low. Despite the lack of evidence on frequency of repositioning, there is an international adoption of turning regimes between 1 and 3 hourly depending on the condition of the patient in the face of limited evidence.

To be effective, repositioning schedules and techniques used must incorporate the patient's medical condition, functional ability and support surface used. The patient with a hip fracture presents unique repositioning challenges. Preoperatively, the fracture stabilization technique being used and, postoperatively, the fracture fixation technique and limitations on motion prescribed by the physician must be considered. When repositioning a patient it is important to lift, not drag, the patient across the

support surface to avoid friction and other injuries. Transfer aids such as manual handling equipment, including slide-sheets help reduce friction and shear forces. The use of these devices must be made with consideration of the type of fracture, physical limitations of the patient and postoperative restrictions imposed. Repositioning a patient with a hip fracture may require more than one caregiver.

Patients should not be turned onto a body surface that remains red after previous repositioning, as this indicates the skin on that surface has not recovered from previous pressure loading. Massaging or vigorously rubbing at-risk skin surfaces should be avoided as it can be painful and may cause tissue damage. Maintaining the patient's heels off the bed surface by using heel-protection devices, e.g. a waffle boot or a pillow under the calf is essential. Placing a pillow under the calves and keeping the knee in slight flexion may also help to minimize risk of deep vein thrombosis. When repositioning the patient on their side after surgery, consider any postoperative restrictions. Place a pillow or padding between the legs to prevent tissue trauma at the knees and ankles.

When raising the head of the bed for patients who are allowed postoperative hip flexion, raise the knees first, then the head of the bed (no more than 30 degrees). Roll the patient slightly to one side to release shear, then settle back down so that the patient's hips and knees are in alignment with the bends in the bed (Mimura, et al., 2009). When the patient is able to sit in a chair, limit the time, and use a pressure-redistributing cushion to decrease the risk of pressure ulcer/injury development. Similar

repositioning schedules should be used with seated as with supine patients to reduce pressure on the ischia.

Skin care and treatment

Appropriate preventive care for skin may minimize progression through the stages of PU/PI. Normal age related changes result in older adults having dry skin. Use skin emollients for hydration as dry skin is a significant risk factor on its own. Skin damage from moisture is not a pressure ulcer/injury, but the presence of skin damage from moisture may increase the risk of pressure breakdown. Protect skin from excessive moisture using a barrier product as needed. Use breathable, 'wicking' under pads and avoid the use of adult briefs for immobile incontinent patients as they can contribute to incontinence associated dermatitis (NPUAP-EPUAP-PPPIA, 2014). When deciding on treatment plans, distinguish skin excoriation due to moisture (moisture associated dermatitis) or incontinence (incontinence associated dermatitis) from those due to pressure.

Pressure Ulcer/Pressure injury Staging

Should a PU/PI occur, it is important to correctly describe the wound. The EPUAP, NPUAP and PPIAP (2014) describe pressure ulcers/injury by category/stage according to the appearance of the tissue involved. The terms unstageable and deep tissue injury used in the USA are sometimes graded as Category IV in some of Europe. Most important is that the actual definition of pressure ulcer/injury and the level of

skin/tissue injury are the same, regardless of the terms used www.epuap.org/pu-guidelines/.

Go to www.visualdx.com/public-health/pressure-ulcer to view photos of pressure ulcers with illustrations of the depth of the wound; or to or to NPUAP a free resource containing staging illustrations www.npuap.org/resources/educational-and-clinical-resources/pressure-injury-staging-illustrations/

Self-management strategies

With your guidance, patients and their families can participate in preserving intact skin by being reminded to:

1. Change position at least every 2 h to relieve pressure
2. If you cannot move yourself, ask for help changing your position
3. Moisturize dry skin
4. Inform your nurse of any reddened, purple, or sore areas of the skin
5. Inform your nurse of problems with leaking urine or stools
6. Clean skin immediately if it is soiled with urine or stools
7. When lying on your side, use pillows to pad areas between knees and ankles
8. When lying on your back elevate heels off the bed or off the foot rest if sitting in a chair
9. Do not lie directly on your hipbone
10. Eat a well-balanced diet

<https://www.nice.org.uk/guidance/cg179/chapter/1-Recommendations#prevention-adults>

<http://www.npuap.org/wp-content/uploads/2016/04/Pressure-Injury-Prevention-Points-2016.pdf>

Pressure ulcer/injury prevention: Summary of Best Practice

- Perform a head to toe skin inspection on admission
- Assess for pressure ulcer/injury risk using a validated measure such as the Braden or Norton on admission and q shift.
- Hip fracture patients will be positioned with pressure on the non-fracture side, inspect the 'down side' after surgery for signs of skin damage
- Alleviate pressure with pressure redistributing surfaces, repositioning and offloading heels.
- Moisturize dry skin

FLUID BALANCE/NUTRITION/ELIMINATION

Following hip fracture surgery, older adults may experience one or more common post-operative complications including delirium, heart failure or myocardial ischemia, deep vein thrombosis (DVT), pneumonia, pulmonary embolism (PE), anemia, urinary retention, and urinary infections which increase length of stay and perioperative mortality (Carpintero, et al, 2014). These “common” complications can affect the fluid balance, nutrition, and elimination status of the older adult with hip fracture and rarely occur in isolation. Malnutrition is prevalent in older people, but is even more common in hip fracture patients (Chong, et al., 2010). This section addresses those aspects of care that benefit most from nurse-initiated interventions: dehydration, malnutrition, constipation and catheter-associated urinary tract infections.

FLUID BALANCE

Age related changes in homeostatic mechanism and underlying co-morbidities increase the vulnerability of older people to the physiological stresses associated with hip fracture and subsequent surgery. Frail, older hospitalized patients are at risk of dehydration, fluid overload, heart failure and electrolyte disturbances. Perioperative anemia prevalence ranges from 24% to 44% (Bateman, et al., 2012) and acute kidney injury occurred in 24% of hip fracture patients in a study of over 2000 individuals (Porter, et al, 2017). Myocardial ischemia in this population ranges from 35% to 42% (Huddleston et al, 2012) with heart failure reported in 21% (Carbone, et al, 2010). Pre-existing heart failure or renal conditions may worsen due to the stress of surgery and the hospital experience. These are serious conditions that may lead to organ damage, delirium, functional decline and increased mortality. Fluid balance monitoring and optimization is, therefore, a clinical imperative.

Dehydration

Dehydration is depletion in total body water content due to pathologic fluid losses, diminished water intake or a combination of both. As it worsens, it can result in hypernatremia (more than 145mEq/L) in the extracellular fluid compartment that, in turn, draws water from the intracellular compartment. The water loss is shared by all body fluid compartments and, as a result, relatively little reduction in extracellular fluid occurs. Thus, circulation is not compromised unless fluid loss is very large (Mentes,

2016). Madsen and colleagues (Madsen, et al, 2016) found that both hyponatraemia and hypernatremia are prevalent in patients admitted with hip fracture and are associated with increased risk of 30-day mortality.

When dehydration is significant enough to decrease circulatory volume, it results in diminished perfusion to organs and tissues and is implicated in the development of delirium, acute kidney injury (AKI), pressure ulcers, falls, venous thromboembolism, impaired mobility, catheter associated urinary tract infection (CAUTI) and cystitis.

Dehydration is prevalent among hospitalized older adults with potential significant adverse consequences. Older adults admitted to acute care from residential facilities may present with dehydration or fluid deficits, perhaps due to pre-existing restricted fluid intakes, and hospitalization may compound pre-existing dehydration or increase the risk for dehydration.

Dementia, delirium, decreased manual dexterity and immobility, as well as communication and sensory impairments, can all contribute to dehydration, particularly if there is a delay in presentation to hospital or to surgery. Normal age related changes result in diminished thirst reflex and increasing risk of diminished fluid intake. Those patients who suffer from incontinence may limit fluid intake as a measure to reduce the risk of incontinence due to perceived lack of timely access to toileting although Townsend and colleagues (2011) note that results from a self-reported questionnaire completed by 65,197 women aged 37-79 did not show a significant risk of incident urinary incontinence with a higher fluid intake.

Nevertheless, limited mobility, unfamiliar environment, concerns that requests for assistance will not be prompt enough to meet their need, and the desire to preserve dignity are factors that may influence this decision. Since hip fracture occurs in an emergency context, delay to surgery with an extended period of pre-operative fasting is also a risk factor

Screening/detection

Evidence supports taking a thorough clinical history that includes identifying the patient's average daily fluid intake. However, recent systematic reviews (Oates & Price, 2017; Hooper, et al., 2015) agree that specific clinical activities to prevent dehydration are not supported by strong evidence and that it is currently not possible to recommend a specific clinical assessment. A Cochrane review (Hooper, et al., 2015) found that only 3 tests (out of 67 tests evaluated) demonstrated any ability to diagnose water loss dehydration: the patient expressing fatigue, missing drinks between meals, and bioelectrical impedance analysis (BIA) resistance at 50Khz. The review also noted that there was sufficient evidence to suggest that a range of stand-alone symptoms, signs, and tests often used to assess dehydration should NOT be relied upon individually for assessing the presence or absence of dehydration in older people. These individual signs/symptoms/tests include: fluid intake, urine specific gravity, urine color, urine volume, heart rate, dry mouth and feeling thirsty.

Prevention and management strategies

Because clinical assessment of dehydration is elusive, fluid management is critical. Fluid and electrolyte management begins with screening in the Emergency Department and includes documentation of the approximate time the fracture occurred, and formal recording of the patient's current fluid status. Once a review of the patient's coexisting medical problems is correlated against their likely fluid balance, patients should have clinical and laboratory assessment for possible hypo or hypervolemia and electrolyte imbalance. Any identified deficiencies should be promptly and appropriately corrected (Johnstone, et al., 2015).

Where delay to surgery occurs, and extended periods of fasting ensue, nursing staff must ensure that the patient receives adequate hydration. Wherever possible, attempts must be made to minimize periods of fasting from oral food and fluids in accordance with local evidence-based guidelines and policies. Mouthcare is always important, but especially-s when oral fluids are restricted.

A nursing assessment of swallowing and/or referral for formal swallow screen should occur where there is concern about the safety of the patient's ability to swallow. Early resumption of oral intake in the post-operative period is preferable, with intravenous supplementation secondary.

Patients' access to fluids in the hospital setting is often limited. Drinking containers should be ergonomically suited to be manipulated by older patients and placement of the container should consider any visual limitations. Brightly colored cups for visibility to prompt fluid intake and plastic sports bottles that decrease concern about spilling can be provided for patients who need them (Robinson & Rosher, 2002; Wakeling, 2011).

Nurses should proactively offer fluids at each contact rather than inquiring about the patient's desire for a drink (Hodgkinson, et al., 2003). Intentional, scheduled nursing rounds ("rounding") should include hydration needs; taking a beverage cart on rounds provides immediate access for patients. Regular reminders to drink may be successful for patients with cognitive impairment (Simmons, et al., 2001).

Fluid Overload/Heart Failure

Some older adults with hip fracture require more careful monitoring for fluid overload/heart failure. Diminished cardiac and renal function renders the frail older adult susceptible to fluid overload i.e. more fluid than the heart can effectively pump. Heart failure is associated with fractures independent of bone mineral density (Majumdar, et al, 2012) and hip fracture was independently associated with subsequent risk of coronary heart disease in a study by Tsai and colleagues (2015). Likewise, acute kidney injury (AKI), a frequent complication after hip fracture surgery (Porter, et al, 2017; Ulucay, et al., 2012), can contribute to the development and exacerbation of heart failure symptoms through fluid retention.

Assessment/detection

In addition to cardiac or renal disease, risk factors for dehydration include large or rapid infusions of fluids, and intravenous infusion with sodium solution. Heart failure manifests with both pulmonary and peripheral edema.

The stress of surgery leads to an increased secretion of the antidiuretic hormone (ADH) that impairs the ability to excrete sodium and water. Symptoms to monitor include:

- Increasing blood pressure / JVD
- Orthopnea
- Moist breath sounds
- Peripheral edema
- Decreased urinary output

(Miller, 2016; Rogers & Bush, 2015)

These symptoms are not diagnostic, rather they suggest that further evaluation is warranted and the physician or advanced practice nurse should be advised of the patient's symptoms.

Prevention and management strategies

Fluid intake and output must be carefully monitored. Fluids should be titrated, diuretics and other medications administered with or without restriction of sodium intake in consultation with the physician or advanced practice nurse.

Electrolyte Disturbances

Renal and cardiac decline, dehydration and fluid administration as well as fluid losses during surgery, increase the risk of electrolyte disturbances. Disturbance in serum sodium levels are common in older adults and are associated with delirium, falls and

subsequent hip fractures (Morley, 2015; Grundmann, 2016). Inadequate hydration in the elderly is associated with increased morbidity and mortality (Picetti, et al., 2017).

Assessment/detection

Risk factors include cardiac or renal dysfunction, dehydration or fluid overload, and the use of diuretics. The physician or advanced practice nurse should be consulted to ensure that lab tests are ordered for at risk patients and abnormal results reported appropriately. Abnormal levels of blood electrolytes and renal function should be regularly monitored until returned to baseline (Agency for Clinical Innovation, 2010).

Prevention and management strategies

Fluid balance should be monitored and managed as described above. Consult with the physician or advanced practice nurse for clinical interventions to address imbalances.

Self-management strategies

Engage the patient and family in learning about the:

- Importance of hydration and how dehydration affects health and activities of daily living: e.g., decreased energy, risk for falls.
- Strategies for facilitating hydration: e.g. readily available water or decaffeinated drinks in easily manipulated containers, drinks offered with each interaction, written and verbal reminders to drink adequate fluids
- Strategies to mitigate incontinence: e.g. timing of fluids earlier in the day or spreading fluids throughout the day, regularly scheduled toileting
- Awareness of medications and their impact on fluid balance and importance of adhering to dietary and fluid restrictions/guidelines (e.g., sodium restriction).

NUTRITION

Nutrition plays a key role in recovery after hip fracture surgery. Often associated with aging, malnutrition is defined by the European Society of Parenteral and Enteral Nutrition (ESPEN) as “a state resulting from a lack of intake or uptake of nutrients leading to diminished physical and mental function and impaired clinical outcome from disease” (Cederholm, et al, 2017, p 51). Studies suggest that malnutrition is common in hospitalized older adults with rates as high as 70% in those with hip fracture (Miu & Lamb, 2017; Aldebeyan, et al., 2017). A recent study of 509 hip fracture patients found protein malnutrition and vitamin D deficiency to be the rule following hip fracture (Diaz de Bustamante, et al., 2018). Multiple studies associate malnutrition with impaired muscle function & disability, loss of independence, lower cognitive function, decreased quality of life, delayed wound healing, higher complication rates, longer length of stay, extended rehabilitation time and increased hospital and post hospitalization mortality (Bell, et al 2016; Inoue, et al., 2017; Li, et al., 2013; Orlandoni, et al., 2017).

During hospitalization, hip fracture patients are reported to consume only half of the recommended daily energy, protein and other nutritional requirements (Bell, et al. 2016). While malnutrition is a common problem, it is often overlooked, thus increasing the risk of complications after surgery. Attention to early screening of nutritional status, prompt intervention to support at-risk patients and ongoing monitoring to ensure energy needs are being met are essential. Treatment should be patient focused and aimed at minimizing further nutritional decline throughout the recovery period (Malafarina, et al, 2018). Several studies have shown high protein oral nutritional

supplements to be beneficial in reducing infection rates and improving function (Malafarina, et al 2017; Liu, et al 2015), while a systematic review conducted by Avenell, et al (2016) found only low level evidence supporting nutritional supplementation as an effective strategy to prevent complications in this population.

Detection/assessment

It is critical that nurses screen patients on admission using a validated malnutrition risk assessment measure as part of an admission screening process. Examples of commonly used validated measures include the Mini Nutrition Screen Short Form (MNA-SF), Malnutrition Universal Screening Tool (MUST), Nutrition Risk Screen 2002 (NRS2002) and the Geriatric Nutrition Risk Index (GNRI). Inoue et al., (2018) reported results from a longitudinal study of hip fracture patients and found the MNA-SF to be the optimal screen associated with functional outcomes during the postoperative acute phase in elderly patients with hip fracture. The MNA-SF is available in a number of languages and can be found at this website. https://www.mna-elderly.com/forms/mna_guide_english_sf.pdf. A copy of the MUST tool can be accessed at: <http://www.bapen.org.uk/nutrition-support/assessment-and-planning/nutritional-assessment>

In addition to screening, nurses are ideally positioned to identify other factors that impact nutritional intake. Attention should be paid to those patients who have difficulty swallowing, poor dentition, arthritic joints that limit range of motion, poor vision, cognitive impairment, and food related cultural preferences/practices, as these

are all potential contributors to poor food intake and subsequent malnutrition.

Awareness of risks and early initiation of nutritional care are essential in order to prevent malnutrition.

Prevention and management strategies

The management and prevention of malnutrition is an interdisciplinary concern. Early identification of at-risk patients coupled with prompt intervention, in collaboration with the dietitian, to optimize nutritional status, are essential elements of a malnutrition prevention program. Strategies to raise awareness of the entire team may include the use of colored trays and other methods that prioritize high-risk patients.

The use of informal caregivers, to support good nutrition in hospital, as an adjunct to professional nursing care, has proven effective. An example is the Elder Life Program (HELP) created by Dr. Sharon Inouye (Inouye, et al, 2000). This program was developed to reduce delirium using informal caregivers to assist with meals and engage in social interaction with elderly hospitalized patients (Steunenbergh, et al, 2016). Chen, et al., (2014) report on the adaptation of the program to focus on surgical patients with specific attention to cognition, nutrition, and mobility - with positive results.

An example of a nurse-led protocol to provide timely nutrition support should include:

- Nutrition screening on admission with a validated tool

- Protocols that minimize periods of pre-operative fasting in accordance with local policies and Anesthesia, AAOS, and American Geriatric Society recommendations
- Where concern exists document food & fluid intake (Food Diary)
- Early initiation of multi-nutrient supplements, high energy, high protein, vitamin & mineral, starting in the pre-operative period where possible (Botella-Carretero, 2010)
- Dietician consult for comprehensive assessment, including discussion of cultural restrictions
- Initiate nourishing fluids/mid-meal snacks
- Encourage early resumption of oral intake
- Discontinue IV therapy when tolerating oral fluids & diet
- Speech Therapy review for assessment of swallowing if appropriate
- Optimize oral intake at meals: dentures, positioning for meals, assisting feeding as necessary
- Consult with social work to further investigate cases where concerns exist about access to food prior to admission.

Where extended periods of inadequate oral intake exist, consideration must be given to avoid 're-feeding syndrome' (RFS). RFS is defined as "a clinical complex which encompasses acute fluid and electrolyte disturbances associated with metabolic abnormalities in starved individuals as a consequence of reintroduction of feeding,

whether oral, enteral or parenteral” (Pourhassan, et al, 2018b). A cross sectional multicenter study of hospitalized older adults at risk for malnutrition found 70% of the patients were at risk for RFS. (Pourhassan, et al, 2018a).

There are many factors that impact an older adult’s consumption of adequate nutrients and need to be considered, including: pain, missing dentation, poor oral hygiene, reduced ability to manipulate containers and utensils due to arthritic changes in hands, visual disturbances, and normal age related changes resulting in diminished taste buds and blunted thirst drive. While in the hospital, environmental factors include issues such as; lighting, proximity of food and drink for easy access, containers that are difficult to open and hold, and restrictions related to processes of care. Postoperatively patients should be out of bed in a chair for meals or have the bed positioned in a chair position to aid digestion. If the patient is unable to take food orally, consideration should be given to temporary nasogastric feeding. This decision should be made in full consultation with the patient or surrogate decision maker and with consideration of advanced care planning and end-of-life decision-making.

Self-management strategies

Self-management strategies are important, not only while in the hospital, but throughout the continuum of care. It is important to recognize the social aspects of eating and drinking with others; some hospitals have provided communal spaces for meals (Gordge, et al.,2009). When caring for patients with dementia it is essential to partner with available family to ensure optimal outcomes. Inviting family members to

visit during meal times and bringing in favorite foods, within dietary restrictions, are effective strategies to increase food consumption and provide socialization, encouragement and assistance from someone familiar to the patient.

Prior to discharge, it is important to engage the patient and family in multidisciplinary learning about the benefits of nutrition to healing, recovery and well-being. Important topics include:

- The role of nutrition in preserving health and personal goals e.g. preventing hospitalization, re-hospitalization, post-operative infection etc.
- The benefits of consulting a dietitian to develop specialized menus and meal planning strategies at home
- The need for families to monitor: ability to obtain food, prepare meals and the tendency to regularly skip meals, especially if living alone
- The availability of community resources for meals and dietary assessment/services
- The strategies to mitigate incontinence e.g. timing of fluids earlier in the day, regularly scheduled toileting
- Chronic illness/medications and their impact on fluid balance
- The importance of adhering to dietary and fluid restrictions/guidelines
- The warning signs of dehydration and fluid overload and what to do.

ELIMINATION

An assessment of elimination habits/issues should be made on admission as part of the comprehensive assessment. Early resumption of baseline bowel and bladder habits must remain the priority following hip fracture. This section addresses two common complications related to elimination: constipation and catheter-associated urinary tract infection (CAUTI).

Constipation

Risk factors

Prevention of constipation should be considered in the early management of hip fracture patients. It is a common problem in this population (Neighbour, 2014) particularly among older adults in long-term care facilities who may take laxatives on a daily basis (Bailes & Reeve, 2013). Common contributors to constipation include; dehydration, immobility, poor fluid intake, decreased dietary fiber and general changes to normal dietary routines. Opioid analgesics, even in low doses also cause constipation (Scottish Intercollegiate Guidelines Network, 2009) and “unlike other side effects associated with opioid use, patients do not develop a tolerance to constipation” (Sani & Mahan, 2015, p. 612). Constipation is an under-appreciated cause of delirium in the older patient.

Assessment/detection

People experience the symptoms of constipation differently and it is influenced by both cultural and psychological factors (Bailes & Reeve, 2013). Constipation can manifest at any point along a continuum that ranges from general gut discomfort, headache,

fatigue, nausea and vomiting, abdominal or rectal pain to abdominal distension and bowel obstruction. Agitation and delirium may accompany any or all of these symptoms.

The Joanna Briggs Institute (JBI) (2008) best practice guidelines suggest the following:

- Document baseline (on admission to hospital) and usual bowel patterns
- Evaluate and document severity of constipation
- Document improvements or progression of constipation and/or response to management of constipation.

Prevention and management strategies

Prevention of constipation is the goal; it requires a proactive, preventive approach (Dougherty, , 2015). Wherever possible the impact of constipation should be minimized and is best avoided altogether. An emphasis on privacy, dignity, orientation, good accessibility to toilet facilities (especially for people with dementia/delirium) and signage are all nurse-initiated strategies. An evidence based bowel protocol should be one that incorporates: pre-emptive aperients/laxatives, a high fiber diet and fluids as recommended in the British National Formulary for drug-induced constipation (Scottish Intercollegiate Guidelines Network, 2009). Consideration should be given to using a standardized grading tool such as the Bristol Stool Scale (Lewis and Heaton, 1997).

In addition to opiates, a range of medications can contribute to constipation including (but not limited to): diuretics, anti-hypertensives, anti-cholinergics, iron supplements, phenothiazines, tricyclic and tetracyclic antidepressants and antacids (Dougherty, et al, 2015). Conversely, patient preoperative overuse of laxatives or inadequate-fluid intake

should not be underestimated as a problem surrounding the management of constipation.

Some recommendations for practice include:

- Avoid delay to surgery and extended periods of fasting prior to surgery whenever possible or institute proactive measures to minimize decreased bowel motility
- Encourage fluids to a minimum of 1500mL oral fluid daily unless otherwise restricted
- Institute a regular toileting regime (every 2 hours) that encourages ambulation and discourages the use of bedpan.
- Proactively monitor bowel habits daily: record description and frequency of bowel movement (Clarke & Santy-Tomlinson, 2014).
- Aim for bowel movement by post op day 2 then every 48 hours thereafter (Auron-Gomez and Michota, 2008).
- Prevent secondary fecal impaction through routine, organized implementation of the above strategies.
- Regularly assess the need for opioid analgesia as these drugs affect peristalsis (Neighbour, 2014)

Catheter associated urinary tract infection (CAUTI)

Reportedly, 40% of all nosocomial infections are attributed to infections of the urinary tract (UTI) and 80% of these infections are associated with the use of an indwelling urinary catheter (IUC) (Joanna Briggs Institute, 2010; Center for Disease Control, 2009). A high index of suspicion for urinary tract infection (UTI) should be ever present in the older adult with hip fracture.

Asymptomatic bacteriuria is a common occurrence following hip fracture (SIGN, 2009) and the use of an IUC is the major cause of hospital acquired UTI (Lam, et al., 2014). Care providers may see indwelling urinary catheters as beneficial, helping to prevent falls and to address urinary incontinence and patients will sometimes request them or refuse discontinuation. It is important to remember that IUC's are not innocuous devices. In addition to increasing the risk for CAUTI, indwelling catheters are associated with local trauma to the urinary meatus, restriction of mobility, pain, encrustation, delirium and increased risk of mortality. A recent study by Bliemel et al., (2017) of 402 surgically-treated older hip fracture patients concluded that those who developed a CAUTI seemed to be at risk of inferior functional outcomes.

Assessment and risk factors

Significant risk factors for the development of catheter associated urinary tract infections (CAUTI) include: duration of catheter 'dwell time', improper insertion technique, insertion outside the operating room, inadequate cleansing with soap and water, and failure to maintain a 'closed' system of drainage (Center for Disease Control, 2009; Gould, et al., 2010; Chenoweth, et al., 2014). Women have a higher risk of CAUTI

than men. Admission assessment should include information regarding the nature of the patient's usual bladder function. Ongoing vigilance and documentation of the signs and symptoms of UTI must continue throughout hospitalization. An indwelling urinary catheter should be used in operative patients as an exception rather than as routine.

The Center for Disease Control (2009) supports the following indications for indwelling urinary catheter use:

- Urinary retention or obstruction unrelieved by straight catheterization
- Stage 3 or 4 pressure ulcer in perineal area, sacrum or ischial tuberosity
- Close monitoring of cardiac or renal function in critically ill patients
- Comfort care measures in terminal illness
- Prolonged surgical intervention or surgery requiring decompression of the bladder.

Prevention and management strategies

The presence of a urinary catheter predisposes the patient to acquiring a urinary tract infection and the foremost preventive strategy is avoidance of or decreasing the duration of catheter dwelling time (Chenoweth, et al., 2014; Lo, et al, 2014). When an indwelling urinary catheter is deemed necessary, maintain adequate fluid balance and accurate recording of input and output, effective analgesia and routine catheter care. It is important to secure the catheter, avoid dependent loops in the drainage tube and position the collection bag below the level of the bladder (CDC, 2009).

There is ongoing discussion and research regarding silver alloy-coated and antibiotic-impregnated catheters and their potential for preventing CAUTI. However, a Cochrane Database Systematic Review (Lam, al., 2014), found that silver alloy coated catheters were not associated with a statistically significant reduction in symptomatic CAUTI and that, although nitrofurazone-impregnated catheters produced reduced risk of symptomatic CAUTI and bacteriuria, the reduction was low and may not be clinically important. Similarly, a multicenter randomized controlled trial reported no significant clinical benefit with either of these catheters during short-term (<14 days) catheterization (Pickard, et al., 2012). The most recent SHEA/IDSA Guidelines for prevention of CAUTI in acute care hospitals recommend that use of antimicrobial-impregnated catheter should not be considered a routine part of CAUTI prevention (Lo, et al, 2014).

There is unanimous support for the removal of the catheter at the earliest convenience, preferably within the first 24 h, to minimize infection (CDC, 2009; Chenoweth, 2014; Lo, et al, 2014; Wendt, et al., 2016). If there is a need to retain the catheter after 24 h, the clinical indication should be documented and continual monitoring for removal when clinically appropriate. After removal, monitoring the patient for retention/incontinence is essential.

Nurses play a significant role in reducing the incidence of CAUTI by advocating its use only when clinically necessary and discontinuing as soon as possible. A recent systematic review by Durant (2017) asserts “implementation of a nurse-driven protocol

appears to effectively reduce the clinical predictors and incidence of CAUTI through improved assessment of medical necessity and timely catheter removal”, p.1340. One such tool, the Streamlined Evidence-Based RN Tool: Catheter Associated UTI (CAUTI) Prevention is available at the American Nurses Association website:
<https://www.nursingworld.org/~4aede8/globalassets/practiceandpolicy/innovation--evidence/clinical-practice-material/cauti-prevention-tool/anacautipreventiontool-final-19dec2014.pdf>

Self-management strategies

Engage the patient and family in learning about:

- Risk factors, prevention and management of constipation (e.g., high fiber diet, fluids, mobility)
- Risks for strategies to prevent urinary tract infection
- Perineal hygiene, adequate hydration, avoid indwelling catheter use/alternative strategies to manage urinary incontinence
- Helpful information for patients and their families can be found at nicheprogram.org – click on Resources, click on Need to Know, then click on Care after Hip Fracture

Fluid balance/nutrition/elimination: Summary of Best Practice

- Clinical assessment of dehydration is elusive, so fluid management is essential
- Diminished cardiac and renal function place the frail older adult at risk for fluid overload and potential heart failure

- Constipation can cause delirium in the older patient
- Avoid use of indwelling urinary catheters as they are the major cause of hospital acquired UTI. If inserted, remove within 24 hours
- Malnutrition is a common, often overlooked condition which increases risk for adverse outcomes
- Screen for malnutrition on admission with a validated tool and dietitian referral as indicated

TRANSITIONING CARE

From the moment a hip fracture occurs, the patient experiences multiple transfers between care providers and care settings. Research highlights that these transitions are perilous times for older hospitalized adults due to incomplete and inconsistent sharing of vital information (Kripalani, et al., 2007; Kripalani, et al., 2007). Problems with hand offs (or hand overs) are an international concern. Breakdown in communication was a leading cause of sentinel events reported to the Joint Commission in the United States (2006) and, of the adverse events leading to permanent disability in Australia, 11% were due to communication issues (Zinn, 1995).

Sharing information related to the patients' pre admission level of function, both physical and cognitive, is critical. Access to basic information ensures a plan of care that reflects realistic goals, promotes positive clinical outcomes, and increases the quality of care. Studies have shown that, as patients' transition from one care unit and setting to

the next, if vital information is missed or left out during handoff, the risk for adverse events such as medication errors, nosocomial infections, delirium and pressure injuries increases (Naylor & Keating, 2008; Kanak, et al., 2008).

Management

The world health organization has recommended strategies to ensure safe handoff, including:

- Implement a standardized approach. Consider a framework such as SBAR (Situation, Background, Assessment and Recommendation)
- Incorporate the importance and process of safe handoff as part of employee orientation and continuing education
- Encourage communication between organizations and care providers
- Ensure that, upon discharge, key information regarding treatment plans, medications and test results are shared with the next care team.

Standardizing the handoff process, to ensure vital information is shared, is critical for all patients but especially this vulnerable population. Routine sharing of information regarding the circumstances of the injury provides critical information about baseline functionality. For example, did the injury occur outside the home, while engaged in a social activity, or in the home as a result of falling out of bed or losing balance? Were there other circumstances surrounding the fall such as dizziness or pain? Was the person found lying on the floor after a prolonged period of time?

Ensuring optimal outcome for this population requires an interdisciplinary team approach to care. Fracture repair requires the expertise of an orthopaedic surgeon, however during the acute care stage, a geriatrician should ideally manage these patients. While in the hospital a referral should be made to the fracture liaison service for continued treatment and management of osteoporosis with the goal of preventing a second fracture.

SECONDARY FRACTURE PREVENTION

Osteoporotic or 'fragility' fractures represent a significant health threat worldwide. According to the National Osteoporosis Foundation, a fragility fracture is defined as one resulting from a fall from a standing height or less. The World Health Organization and the International Osteoporosis Foundation report that 40% of women and 15-30% of men will sustain one or more fragility fractures during their lifetime (Melton, et al, 1992; Nguyen, 2007), and, globally, it is estimated that hip fractures will effect 6% of men and 18% of women (Cooper, et al., 1992). Having one fracture increases the risk of a subsequent fracture by 86% (Kanis, et al., 2007). An Australian study that followed community dwelling women (n=952) and men (n=343) aged 60 and older after their initial fragility fracture, reported that within five years of initial fracture, 24% of the women and 20% of men had suffered a second fracture (Bliuc, et al., 2015).

The economic burden imposed by fragility fractures to global healthcare systems is significant. In 2015 the estimated costs of fragility fractures in the USA was in excess of \$20 billion. In 2010 the countries of the European Union (EU28) were estimated to have spent €37 billion on fragility fractures, a cost which is expected to increase by 25%

by 2025. Similarly in China, in 2010, the cost imposed by fractures among people with osteoporosis was estimated to be in excess of US\$9 billion, which is expected to rise to US\$25 billion by 2050 (Harvey & McCloskey, 2016). These costs do not reflect the significant personal, and social costs associated with these fractures. Osteoporotic fractures result in pain, disability, reduced quality of life, loss of productivity, loss of independence and increased risk of dying. Despite these daunting economic and social implications, a review of over 38,000 records, of patients aged 60 or older, discharged after hip fracture, found that less than 20% of these patients were screened for osteoporosis (Sobolev, et al, 2015).

Assessment

It is not uncommon for the person with a low trauma fracture to be treated in the emergency department, primary care health facility or outpatient department and discharged without further investigation of underlying bone health. If bone health concerns are not flagged in this initial consultation there is a missed opportunity for secondary fracture prevention (Kimber & Grimmer-Sommers, 2009). It is important for health professionals to recognize that these fractures are strongly correlated with undetected osteoporosis. Low trauma fractures should serve as a signal to investigate and address underlying bone health with the ultimate goal of preventing 'fracture cascade' which manifests as a series of subsequent and potentially more severe fractures (Eisman, et al., 2012; Kimber & Grimmer-Somers, 2011).

In addition to those who sustain a low trauma fracture, fracture risk should be also assessed in post menopausal women and men over the age of 50 who have risk

factors for fracture which include, smoking, chronic glucocorticoid use, and rheumatoid arthritis. Fracture risk is commonly assessed using the FRAX® tool, which has been used to identify people who may be at risk of developing osteoporosis (Lespessailles, et al., 2017) as well as those at risk of future fractures (Kanis, et al, 2008).

Models of Care

Orthogeriatric model

The orthogeriatric service model (OGS) model is primarily used in the acute care setting and is focused on patients aged 60-65 years and over who present with a fracture from a low trauma incident, typically a hip fracture. The OGS model is an interdisciplinary collaboration between orthopaedic surgeons, orthopaedic nurses, and the geriatric team. The goal is to work collaboratively to optimize the patients' medical comorbidities and manage complications before and after fixation of the fracture. Following the inpatient stay, both teams are responsible for communicating management plans to the patient's primary care physician. The OGS team serves as a vital link to ensure secondary fracture prevention measures are instituted through the recommendation or initiation of osteoporosis pharmacotherapy and implementation of fall reduction strategies and referral to an FLS service for ongoing management (Mitchell, et al, 2016; Grigoryan, 2014).

Fracture Liaison Service model

The National Osteoporosis Foundation (NOF) recommendations for initiating treatment include; those with hip or vertebral fractures, those with a *T*-score in the lumbar spine, total hip or femoral neck ≤ -2.5 , and those with a 10-year probability of hip fracture $\geq 3\%$ or 10-year probability of major osteoporotic fracture $\geq 20\%$, using the US-adapted World Health Organization (WHO) absolute fracture risk model (FRAX) (Cummings, et al., 2017).

Management of osteoporosis should fall under the heading of fracture liaison services (FLS). This model is similar to other chronic disease management models that aim to provide motivated patients and a proactive team of care providers with evidence-based guidance that promotes optimal outcomes. Findings of a task force commissioned by the Society of Bone and Mineral Research (Eisman, et al, 2012) and a review of best practices (Mitchell & Åkesson, 2018) report that the optimal approach to fracture management and the most effective tool for change is a program utilizing a dedicated fracture liaison coordinator. Ganda and colleagues (2013) described 4 “types” of FLS models, categorizing them as type A through type D, ranging from the most comprehensive to the most basic:

- Type A is a service that identifies, investigates and initiates treatment. The program has a coordinator who oversees the program. The coordinator is commonly an advance practice nurse who manages the care of these individuals with referral access to specialist physicians as required.
- Type B service identifies and investigates patients but then **refers back** to the primary care physician for treatment initiation.

- Type C service identifies patients at risk and informs them and their primary care physician. They **do not** undertake any assessment or treatment of the patients.
- Type D service identifies at-risk patients, informs and educates them but takes **no** further part in communicating their findings to other stakeholders in the patient's care

FLS programs that proactively identify at-risk patients and initiate bone health assessments have demonstrated a reduction in re-fracture rate. In the Netherlands, a FLS center had a 56% reduction in re-fracture rate, after 2 years of follow-up. Another study based in Newcastle, Australia, reported that patients assessed by their FLS had a lower rate of re-fracture, 5.1%, compared to those not assessed, 16.4% ($P<0.001$) after 2 years (Nakayama, et al., 2016).

The OGS and FLS are models of service delivery that complement each other to address the post-fracture care gap. Table 4 provides a comparison of the two models.

Insert Table 4 near here

Despite overwhelming evidence demonstrating the efficacy and cost benefit of secondary prevention services, barriers to implementation are many. Healthcare professionals, payer systems and the general public fail to recognize the significant economic and social burden posed by the increasing number of fragility fractures in the growing aging population. As a consequence, resources needed to implement proven prevention strategies are lacking. Addressing these barriers involves, creating a sense of urgency among the general public, health professionals, payer/funding sources and

policy makers, of the global health crisis posed by fragility fractures. Finally, consideration should be given to the incorporation of an automated fragility fracture 'capture' tool linked to diagnosis, diagnostic interventions and reimbursement as a strategy to alert providers and monitor outcomes.

Summary

No matter the approach, maintaining a high level of awareness of the need to investigate underlying bone health by all health professionals who manage and care for people with a low trauma fracture is essential. Vigilance and attention to timely intervention will help achieve the goal of bridging the gap between practice and evidence and reduce the incidence of secondary fracture. Key elements of successful secondary fracture prevention programs should reflect those outlined in specific national guidelines and include: patient identification; post-fracture bone health assessment; evaluating potential secondary causes of osteoporosis; access to falls prevention services; lifestyle risk assessment; initiation of treatment; communication between primary and secondary care; review of treatment plan; plan for long-term management (12 months) and ideally all fragility fractures should to be recorded on a database to monitor effectiveness of care (Osuna, et al., 2017).

Care Transition & Models of Care: Summary of Best Practice

- Standardize hand off process across all care settings
- Investigate and share information on baseline level of physical and cognitive function to ensure optimal outcomes

- Low trauma fracture signals undetected osteoporosis
- Refer to fracture liaison service for ongoing treatment and management of osteoporosis and prevention of secondary fracture

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Box 1: Multiple factors that contribute collectively to frailty, sarcopenia and falls

Potentially treatable:

- Social factors including social isolation, living alone
 - Lack of access to transport
 - Elder abuse
 - Poverty and food insecurity
 - Failure to provide for ethnic food preference
 - Inability to prepare and cook meals or to feed self
 - Inability to shop
 - Alcoholism
- Medical:
- Thyroid disease
 - Cardiac failure
 - Gastrointestinal disease affecting absorption; anorexia (antibiotics/digoxin), early satiety (anti-cholinergic drugs), reduced feeding ability (such as sedatives/psychotropics), dysphagia (NSAIDs), constipation (opiates/diuretics), diarrhea (laxatives/antibiotics), hyper-metabolism (thyroxin)
 - Sensory impairment – vision/hearing
 - Oral problem, that is, poorly-fitting denture
 - Swallowing problem/dysphagia, thickened diet
 - Poorly managed pain or constipation
- More difficult to treat:
- Medical factors
 - Loss of taste and smell, restricted diets
 - Cognition – dementia
 - Catabolism
 - Gastritis
 - Cancer
 - Mood – depression, paranoia
 - Medications/polypharmacy
- Source: Marques, A & Queiros, C 2018, Frailty, Sarcopenia and Falls in: K. Hertz, J. Santy-Tomlinson (Eds.), Fragility Fracture Nursing, Springer International Publishing AG, page 22. Reprinted with permission.

Table 1 : Risk Factors for Delirium

Predisposing factors	Precipitating factors
History of, delirium, dementia or depression	Orthopaedic Surgery - prolonged time to surgery
Advanced age > than 75 years of age	Medications: either addition &/or withdrawal especially anticholinergics,

	benzodiazepines and opioid naivety or sensitivity
Uncorrected Sensory deficits; Hearing/visual	Immobility/restraint use
Infection/severity of illness	metabolic/endocrine/electrolyte disturbances hypoxia; fluid overload, dehydration
Alcohol/substance abuse	Sleep disturbances; noisy environment, overstimulation
Dependency on others for ADL	Indwelling urinary catheters or other immobilizing medical devices
Incontinence	Constipation

Source: Maher, AB, et al. (2012). Acute nursing care of the older adult with fragility hip fracture: An international perspective (Part 1). *IJOTN*, **16**, page 187. Reprinted with permission.

Table 2: Clinical features of depression, dementia and delirium

	Depression	Dementia	Delirium
Presenting Symptoms	Depressed mood, negative self-talk, lethargy, appetite and sleep disturbances	Difficulty w/ recent and remote memory, disorientation to time, place and person; disturbances in intellectual reasoning and thinking	Fluctuating disorientation, mental confusion, emotional lability, manic-like behavior, visual hallucinations. May be lethargic, sleepy/difficult to awaken. May be delusional
Onset/Course	Gradual; typically worse in morning. may be connected to onset of physical illness, loss of family or friends, changes in financial or living situation	Gradual onset; Progression of course depends on cause; typically slow with loss of intellectual functioning; loss of ability to	Sudden; may occur during acute illness or surgery; often at twilight or in darkness; function deteriorates quickly

		perform familiar tasks; inability to problem solve	
Cognitive features	Loss of cognitive functioning is rare, but elder has difficulty concentrating and making decisions, and may experience minor memory loss	Difficulty remembering recent events, (in severe dementia remote memory impaired as well), words difficult to find. Impaired judgment. in early stages attempts to conceal deficits.	Cognitive changes that occur rapidly. Inattention Fluctuating levels of awareness; Disorganized thinking may experience hallucinations/illusions/delusions
Emotional Features	Loss of interest or pleasure in favorite activities; persistent sadness, irritability, & hopelessness. Seems lethargic and apathetic or intensely worried	Passive and withdrawn. May become agitated when confronted about cognitive losses or feels threatened by new people or environment	Hyper -agitated, erratic mood swings, anxious, uncooperative. aggressive Hypo-- lethargic, difficult to awaken.
Physical Features	Vague somatic complaints Looks sad	Fragmented sleep wake cycle Looks "lost" and confused. May dress inappropriately or lack self care	Sleep cycle may be reversed. May have wild-eyed look (anxious) may be disinhibited or disinterested in self care

Source: Maher, AB, et al. (2012). Acute nursing care of the older adult with fragility hip fracture: An international perspective (Part 1). *IJOTN*, **16**, page 189. Reprinted with permission.

Table 3: Delirium prevention strategies

	Prevention strategy
Dementia/cognitive impairment/disorientation	Routine screening Facilitate visits from family/significant others Environmental cues i.e. clocks, signs, day calendar Reorient/remind of situation as long as not anxiety producing Provide reassurance
Dehydration/constipation	Encourage fluids; offer fluids with each visit unless restricted Ensure fluids are accessible and in container easy to manipulate Encourage mobility Aperients, Suppositories, Enemas
Hypoxia	Assess and optimize oxygen levels
Limited mobility	Avoid prolonged bed rest/encourage mobility Encourage active participation in ADLs Ensure access to necessary assistive devices Avoid restraints initiate fall precautions
Infection	Monitor for signs and symptoms of infection Avoid devices that increase risk; i.e. urinary catheters Adhere to universal precautions/infection control practices
Medications	Careful medication review Benzodiazepines and anticholinergic medications should be critically evaluated Alert to potential withdrawal from routine medications not reordered on admission, e.g. benzodiazepines Avoid medications that have CNS side effects
Pain	Assess for pain; monitor for signs in non-verbal patients (One such tool is the PAINAD assessment. Access online http://geriatrictoolkit.missouri.edu/cog/painad.pdf) Initiate and monitor effectiveness of pain management Scheduled, non-opioid analgesics are effective treatment for arthritic pain in elderly patients.
Poor Nutrition	Conduct nutrition screen for all patients Nutritional support for all patients with special attention to malnourished older adults. Ensure dentures fit well Assist to ensure oral hygiene is maintained Be alert to swallowing difficulties
Sensory Impairment	Assess and resolve any reversible causes; eg. wax impaction

	Ensure availability of glasses and hearing aids Large print accurate signage Avoid glare Ensure environment is appropriately lit for time of day
Sleep Disturbances	Limit environmental noise Bundle nursing services to avoid multiple disruptions Time medications to optimize therapeutic effects and maximize sleep Avoid pharmacological interventions unless routine

Source: National Institute for Health and Clinical Excellence. July 2010. Delirium – Clinical Guideline (103).

Table 4: Comparison of FLS and OGS

Component of model	FLS	OGS
Coordinator	Y	N
Setting of patient identification	Emergency department, Outpatient or inpatient, Community health facility	Emergency department or inpatient
Setting of assessment	Outpatient or inpatient	Inpatient
Setting of initiation	Community health facility Outpatient, inpatient or primary care	Mostly as inpatient, rehabilitation or primary care
Types of fractures	Mainly non-hip fractures	Mainly hip fractures
Age	50 years and over	70 years and over
Falls Assessment	Y	Y
Scope of responsibility	Secondary fracture prevention	Perioperative management (optimization for surgery optimizing management of post-operative complications), secondary fracture prevention

Adapted from: Mitchell et al. (2016). Implementation of models of care for secondary osteoporotic fracture prevention and orthogeriatric models of care for osteoporotic hip fracture. *Best Pract Res Clin Rheumatol*, 30(3), page 542. With permission.